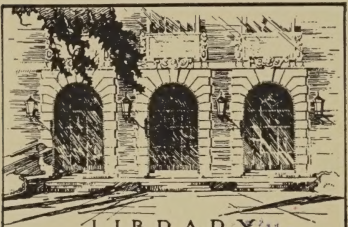

ANTHROPOLOGICAL PAPERS

OF

THE AMERICAN MUSEUM OF NATURAL HISTORY

Vol. XVII

NEW YORK
PUBLISHED BY ORDER OF THE TRUSTEES
1916

Editor

CLARK WISSLER

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ANTHROPOLOGICAL PAPERS

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THE AMERICAN MUSEUM OF NATURAL HISTORY

VOL. XVII, PART I

RIDING GEAR OF THE NORTH AMERICAN INDIANS

BY

CLARK WISSLER

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Editor's Note.

This paper is the first of a volume treating certain phases of material culture in North America. When completed a permanent title page with table of contents and index will be supplied. Then the temporary title pages can be discarded.

RIDING GEAR OF THE NORTH AMERICAN INDIANS.

By Clark Wissler.

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Fig. 1. Camp Scene showing a Saddle staked down while the Rawhide Cover dries and sets. Painting by Catlin in the Mills Collection.

Introduction.

The investigation of the horse culture complex among the American Indians was undertaken to discover the procedure in a concrete case of culture diffusion, an important anthropological problem of the day. One of the most difficult tasks confronting the anthropologist is the elucidation of the precise complexes by which various traits of culture are produced. Since there is on every hand abundant evidence that many traits of culture are borrowed, or diffused, over large areas, the study of typical concrete instances of diffusion are of the first importance. A number of European anthropologists have been so impressed with the significance of diffusion, that they have developed from it a theory to account for the origin of culture traits. This theory is usually known as that of single origin as opposed to the theory of independent invention. The former asserts that all important traits of culture were invented but once and subsequently gradually diffused; the latter, that the same invention was made independently in many parts of the world, whence its diffusion is but apparent. As everyone knows, the discussion of such problems comes to naught unless concrete cases can be investigated.

The horse culture complex of the American Indian offers an excellent opportunity to study diffusion, because most of the essential facts are obtainable. The horse was introduced by Europeans at an early date and spread ahead of interior exploration. In particular, many of the tribes west of the Mississippi River became horsemen before their discovery by Europeans. The history of horse introduction is briefly outlined in the *American Anthropologist*, Vol. 16, No. 1, pp. 1–25. The investigation here reported is the intensive study of collections of riding gear and horse-using appliances to be found in anthropological collections. The material available in the Museum gives us a representative series for each important tribe in the horse-using area so that we may proceed in confidence.

A preliminary statement of the results attained in this study were published in the *Proceedings of the National Academy of Sciences*, Vol. 1, p. 254. In the selection and comparison of specimens the writer has been aided by Mr. William A. Sabine, assistant in the Museum, whose great knowledge of specimens and their distribution was indispensable to the task. Other acknowledgments are due to Mr. S. Ichikawa for the illustrations and to my secretary, Miss Bella Weitzner, for gathering reference material.

July, 1915.

Fig. 2 (50–2289). A Shoshone Saddle.

Frame Saddles.

American Indian saddles are of two distinct kinds readily characterized by the names frame saddle and pad saddle, each representing quite distinct structural concepts.

The fundamental pattern of all the frame saddles we have seen is identical: viz., two parallel side bars, supporting two forked or bowed uprights (a pommel and a cantle), between which is suspended a hammock-like seat. The side bars are of wood ranging in lengths from 31 to 55 cm. though of the sixty-six specimens examined fifty-one fall between 37 and 49 cm. and tend toward two norms, 42 and 48 cm. respectively; their widths average about 9 cm. and their thickness, 1 cm. Their forms vary somewhat but seem to be of four types, straight, curved, boat-shaped, and tree-shaped (like a shoe-tree), Fig. 3*a*, *b*, *c*, *d*. The ends are rounded and pierced with one or two holes for the girths. Tribal differences are not consistent but in the main the tree-shaped side bars are found in the Southwest among the Navajo, Jicarilla, and Hopi and are probably copies of modern trade saddles. The form appears in one specimen from the Sauk and Fox but not elsewhere. The boat-shaped bar is most pronounced in Mescalero saddles. The Ute, Cheyenne, Blackfoot, Sarsi, Winnebago, Menomini, and Plains-Cree are straight. The Shoshone are very slightly curved but the Crow and Dakota decidedly so. The Hidatsa-Mandan are both straight and curved. The number of holes in the ends tend toward uniformity, two for each, but the Ute and Shoshone usually have but one while the Cheyenne vary. In all cases, however, the number is the same in each saddle.

The bows or fronts of the saddles are not so uniform as the side bars, in fact presenting the greatest individuality of all parts. In general, however, they are of four types. The horn type is shown in Fig. 2 and is made of a single piece of wood with a curious prong under the pommel upon which the quirt and rope can be secured. This form occurs among the following tribes: Blackfoot, Crow, Cheyenne, Dakota, Mandan, Sarsi, Shoshone, Thompson, Ute, and Winnebago. In no case is it the only type of bow for the tribe, but is strongly developed among the Shoshone. One Blackfoot saddle (Fig. 6) has bows and cantle of antler which has been trimmed and apparently bent into the required shape.

In the above grouping we have taken all bows having the distinct hook, but in many cases the pommel itself was not of the Shoshone type.

The Y type of bow takes its form from the material. A forked piece of antler is trimmed as shown in Fig. 4. It is most strongly developed among the Cheyenne but occurs among the Crow, Dakota, Thompson,

Mandan-Hidatsa. An analogous form in wood is found among the Sauk and Fox, Winnebago, Menomini, Caddo, and Mescalero. It may be noted that the Ute, Shoshone, Blackfoot, and Sarsi do not have this form.

The bow type results from the use of a simple curved piece of antler,

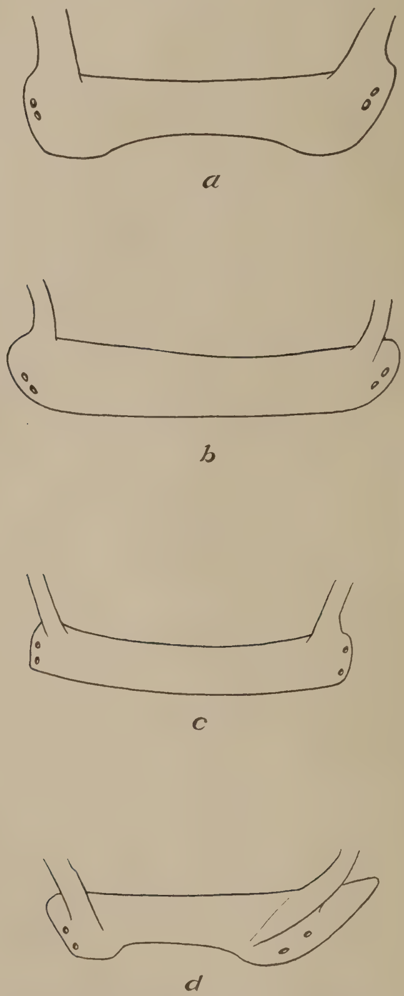

Fig. 3 (*a*, 50.1–6931; *b*, 50.1–465; *c*, 50.1–466; *d*, 50–6780). Side Bar Forms.

not a fork (Fig. 5). It occurs among the Shoshone, Ute, Cheyenne, Crow, Dakota, Mandan-Hidatsa, and Plains-Cree. Somewhat analogous forms in wood are found among the Hopi, Navajo, Taos, Sauk and Fox, and Menomini.

The angular type is found chiefly among the Navajo (Fig. 7). There is one specimen in the Ute collection but that is probably intrusive.

Fig. 4 (50–5526a). Saddle Bow of Antler. Cheyenne.

CANTLES.

As a rule, the cantle of an Indian saddle is a duplicate of the bow. The horn type of bow is accompanied by a cantle of similar shape, but instead of the hook we find an eye for the support of the seat. There are a few saddles in which a Y-shaped bow is used with a simple bowed cantle, but these are not confined to a single tribe. The saddles of the Navajo and of the several divisions of the Apache as shown in the Figs. 7 and 3*d* are nearer to the types of modern saddles and present not only different forms for the cantle and bow but set them at different angles. However, a close inspection of all types of Indian saddles shows that in almost every case there is a slight difference in these angles, the bows tending to be vertical or even slightly inclined inward while the cantles incline outward. This shows that there was a definite concept as to the relations of these two parts.

SEATS.

All the frame saddles we have seen have the suspended seat, simply a broad band of skin supported by the bow and the cantle. Where the bow is supplied with a hook, this is passed through a hole in the skin, while the rawhide binding of the cantle has an eye through which a wooden pin is passed to hold the other end of the seat. With bows and cantles of the Y type, the ends of the seat are looped over the projecting parts while in case of the simple bows they are passed around the horn and sewed. The universality of this seat is shown by its use in the more modern forms of the

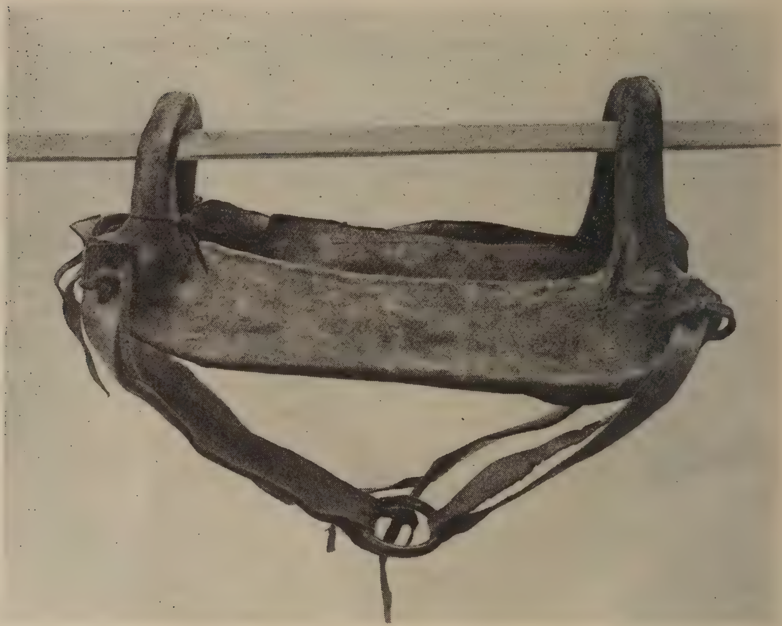

Fig. 5 (50.1–724). A Crow Saddle.

Fig. 6 (50.1–1069). A Blackfoot Saddle.

Fig. 7 (50.1–944). A Navajo Saddle.

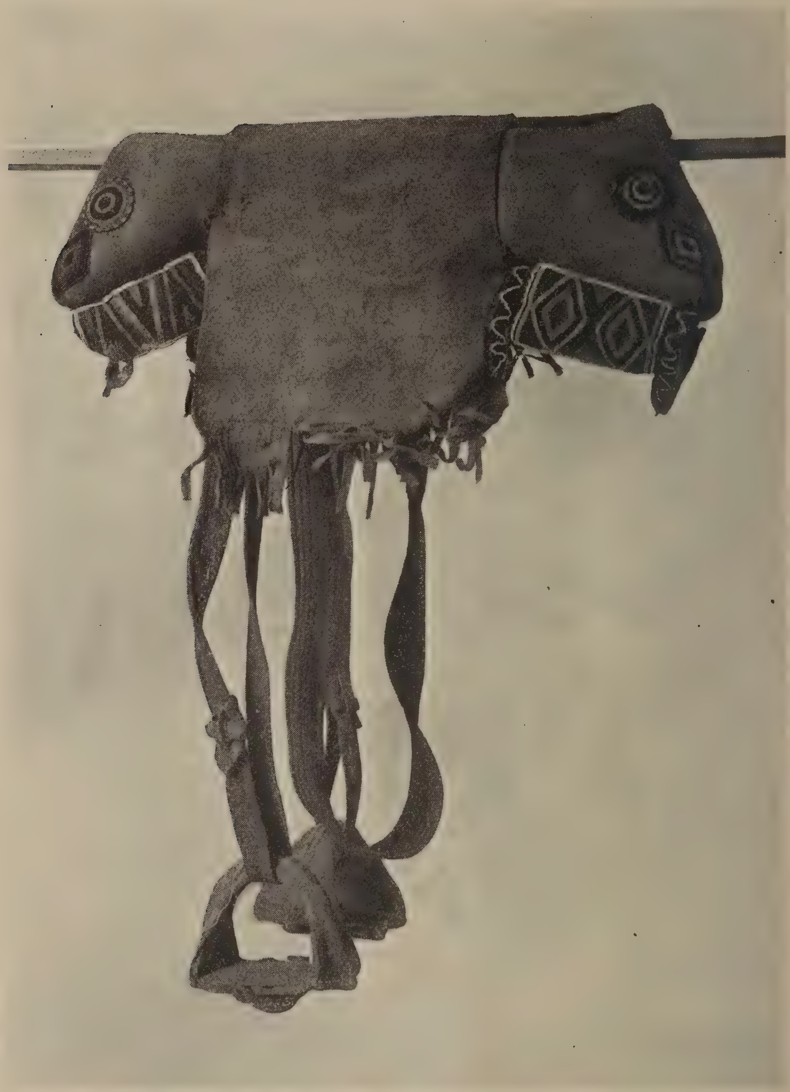

Fig. 8 (50.1–7515). A Pad Saddle. Dakota.

Fig. 9 (50.1–5481). A Mandan Saddle.

Southwest. In some cases frame saddles seem to have been used exclusively for packing and so were not provided with seats.

The fundamental principle of construction seems to be the binding of green or wet rawhide which as it dries, shrinks. In every case the whole surface of the frame is covered. That this is mechanically necessary is improbable and in Navajo saddles the frame is entirely covered with leather in such manner as to preclude any but conventional motives. It seems more likely that the practice of covering the entire frame was naïvely copied from leather-covered Spanish saddles. It is, of course, true that the use of rawhide would add strength to the frame but this could have been secured by binding at the joints. We have no data as to the manipulations in saddle construction but find in the Mills Catlin collection an interesting sketch (Fig. 1).

The pattern for the rawhide cover seems to have been the same everywhere and the seams were uniformly underneath and sewed with the same kind of stitch.

All saddles were provided with a single girth suspended in the middle by two straps as in Fig. 2.

Pad Saddles.

Distinct from the frame saddle is the pad, simply a bag of soft skin stuffed with hair or other soft materials. The Dakota saddle may be taken as the type (Fig. 8).

In our collections are similar saddles from the Blackfoot, Mandan-Hidatsa, Plains-Cree, and Thompson. According to Henry [1] the same type was used by the Assiniboine and Plains-Cree. In all we find essentially the same shape of pad, the strong transverse band of leather to which the girth and stirrups are fastened.

A somewhat different form of pad is found in the Southwest. From the White Mountain Apache we have a very crude pad of reeds covered with buffalo skin and Russell reports similar ones from the Pima.[2] One of more definite form was collected in San Ildefonso. In all of these, the girth is passed over the top.

A special variant of the frame saddle is found among the Mandan-Hidatsa and the Dakota of which the Mandan specimen (Fig. 9) may

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[1] Henry and Thompson, New Light on the Early History of the Great Northwest, Edited by Elliott Coues, New York, 1897, 526.

[2] Russell, Frank, The Pima Indians (Twenty-sixth Annual Report, Bureau of American Ethnology, Washington, 1908), 113.

serve as the type. In this case the wooden side bars are set more nearly vertical than in other types. The bow and cantle are of curved horn and over all is stretched a skin covering.

Stirrups.

As a rule all Indian saddles are provided with stirrups. These, perhaps, more than saddles, exemplify the skill of the workman. A piece of wood about 1 cm. thick and 49 cm. long is cut as shown in Fig. 10. It is grooved as indicated and bent to the form in Fig. 10*b*. Over the overlapping arch is placed a rod or splint whose ends are secured by sinew usually underneath the foot rest. A strip of buffalo hide is then stretched around the outside

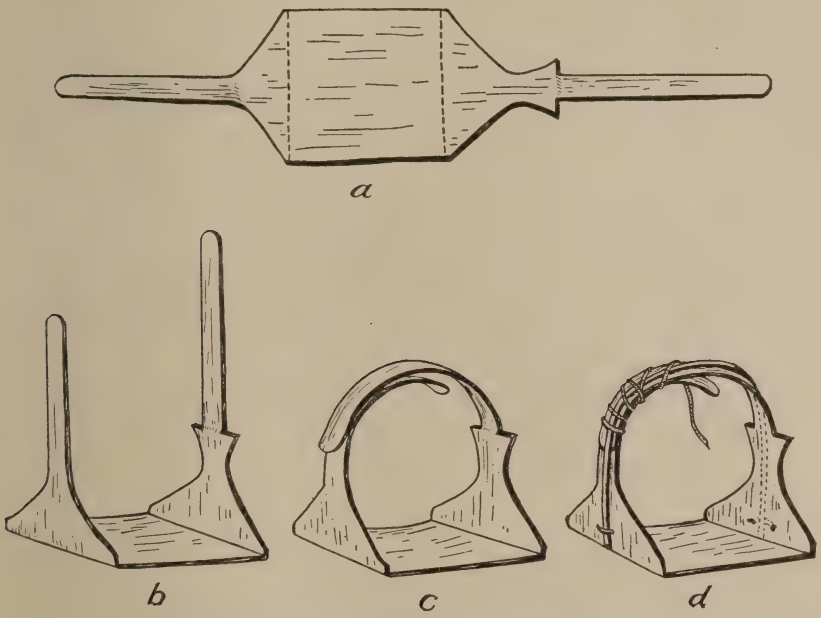

Fig. 10. Method of Constructing Wooden Stirrups.

and secured by lacing under the bottom or foot rest. In almost every specimen we have seen the form of this lacing is precisely the same. At the top of the stirrup the covering is carried entirely around the wooden arch and stitched underneath.

A comparative study of the stirrups in the collection indicates that Fig. 13 is the prevailing type in the Plains. For women's saddles among

the Shoshone, Crow, and Blackfoot, the shape is as shown in Fig. 11, but otherwise the structure is the same. In the Hidatsa-Mandan and Thompson collections there is a variant as shown in Fig. 12.

Teit[1] described a stirrup made from a block of wood. This is almost

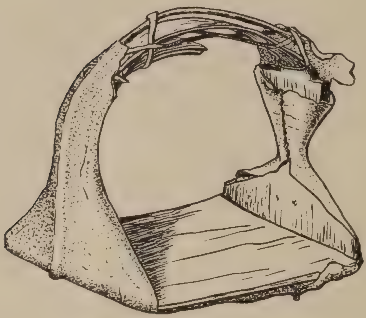

Fig. 11.

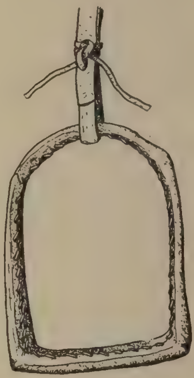

Fig. 12.

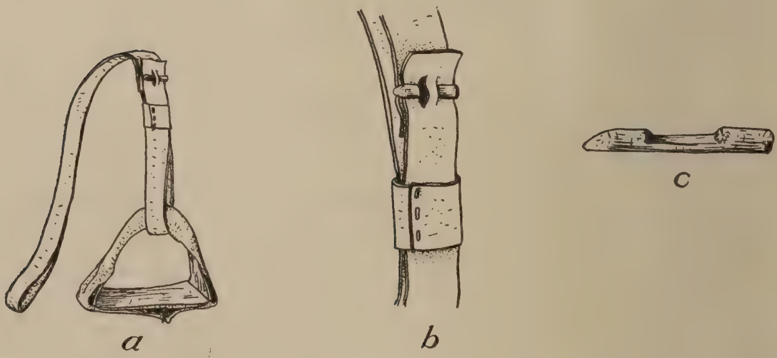

Fig. 13.

Fig. 11 (50–1162). Detail of Shoshone Stirrup.
Fig. 12 (16–9152). A Thompson Stirrup.
Fig. 13 (50–3032b). Detail of Attachment for a Stirrup. Dakota.

identical with a trade stirrup and may, therefore, be considered a direct copy. The saddles from the Navajo and other Southwestern peoples have iron trade stirrups; Russell, however, collected a specimen from the Pima which is apparently made of bent wood.[2]

[1] The Thompson Indians of British Columbia (Memoirs, American Museum of Natural History, vol. 2, part 4, New York, 1900), 258, Fig. 244.

[2] Russell, *ibid.*, 113.

The stirrup is supported by a strap or thong passed over the side bar and through the stirrup. In most cases it rests free upon the side bar so that it may slide forward and backward as desired. It is only in a few Mandan-Hidatsa saddles that a hole is made in the side bar through which the stirrup is passed. In but one Dakota specimen have we found any device for raising or lowering the stirrup except the simple retying of the strap. In this case a kind of toggle has been devised as a substitute for a buckle (Fig. 13).

Accessories.

Many saddles, especially those used by women, are provided with cruppers. Among the Sarsi, Blackfoot, Crow, and Shoshone[1] these are large and ornamental as shown in Figs. 14 and 15. It is interesting to note that we have two specimens from Guatemala of the same general type, Fig. 16. The Spanish horsemen in the days of the Conquest often used very elaborate cruppers and back harness and also highly decorated collars. Of the latter, a form is sometimes found with women's saddles among the Shoshone and Crow.

A single cinch is used and so adjusted as to bear upon the middle of the saddle (see Fig. 2). It is usually a strip of hide but sometimes is woven of hair. On the Thompson specimen (Fig. 17), y-shaped pieces of antler are used to join the cinch to the supporting straps and a short piece of antler inserted in the end of the cinch to serve as a ring.

In some cases the side bars are provided with fixed pads, but it was usual to place loose pads or blankets under the saddle. A special ornamental blanket upon which the saddle rests is used by women among the Dakota, Ute, Crow, and some Shoshone (Fig. 18).

A few saddle bags occur in the collections (Fig. 19) but their exact distribution cannot be determined.

Various ornamental attachments are found, the most typical of which are shown in the figure. The high pommels are usually trimmed with long fringes of buckskin. Among the Ute, Shoshone, and Crow pendant beaded flaps are often seen. In a few cases the bows and cantles are studded with brass nails which among the Navajo seems to be a prevailing style. While the pommel obviously offers opportunity for realistic carving, examples are rare. Figs. 20 and 21 present the only cases noted.

Beaded pendants are usual on the stirrups used by women among the Ute, Shoshone, and Crow (Fig. 22).

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[1] See this series, vol. 5, 94.

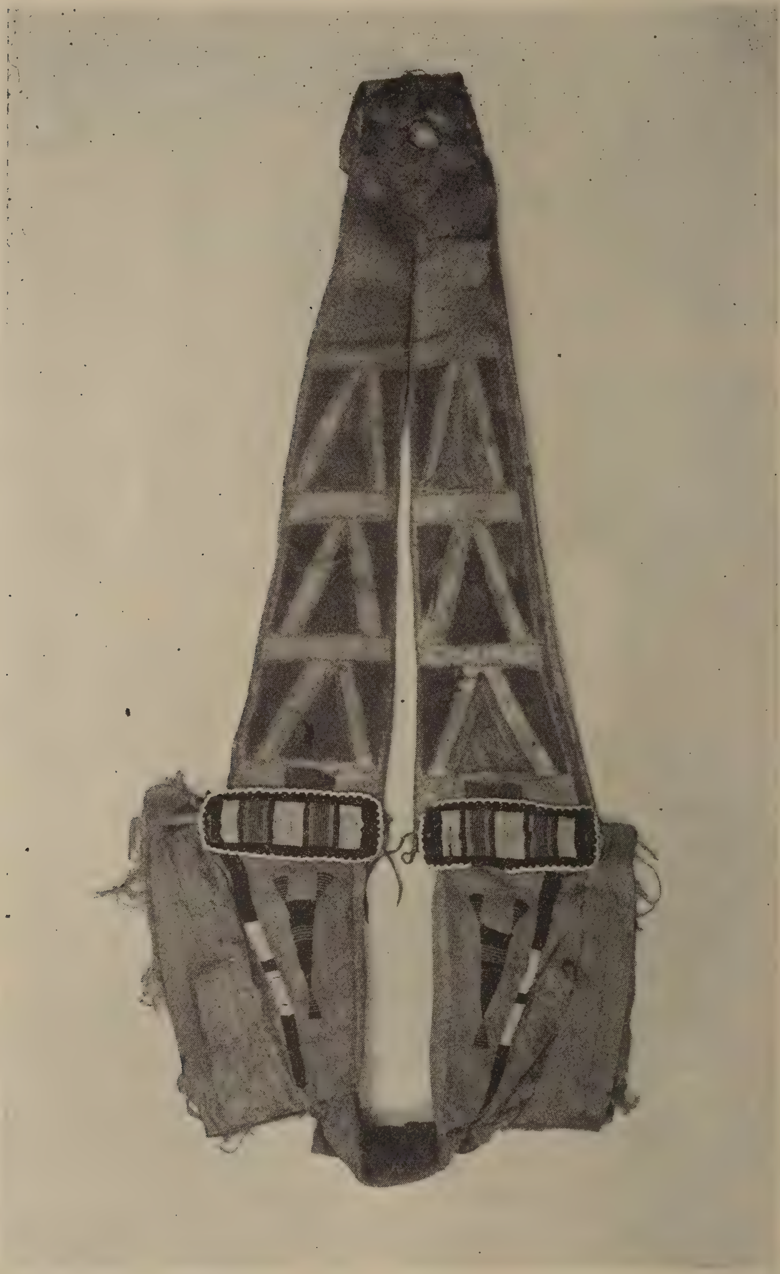

Fig. 14 (50–2291). Crupper for a Saddle. Shoshone.

Fig. 15 (50.1–1067). Crupper for a Saddle. Blackfoot.

Fig. 16 (65–2177). Crupper for a Saddle. Guatemala.

Fig. 17 (16–9152). Saddle with Native Attachments. Thompson.

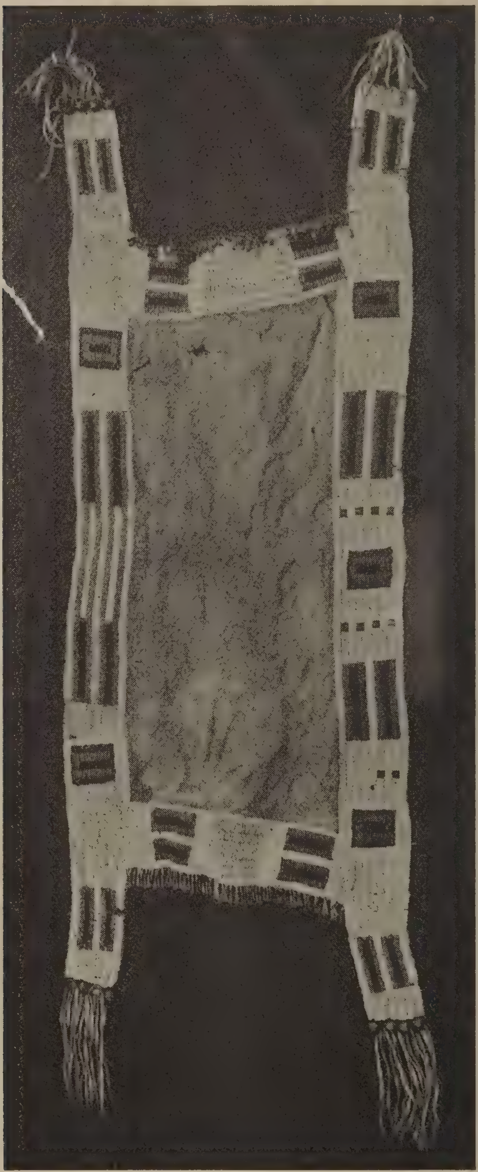

Fig. 18 (50.1–7503). Saddle Cloth of Buffalo Skin. Dakota.

Fig. 19 (1–2642). Saddle Bag of Buffalo Skin. Dakota.

Fig. 20 (16–8710a). Saddle with Carved Antler Bow and Cantle fashioned and decorated to resemble Bird Heads. Thompson.

Fig. 21 (50–4848). Wooden Saddle with Carved Cantle. Menomini.

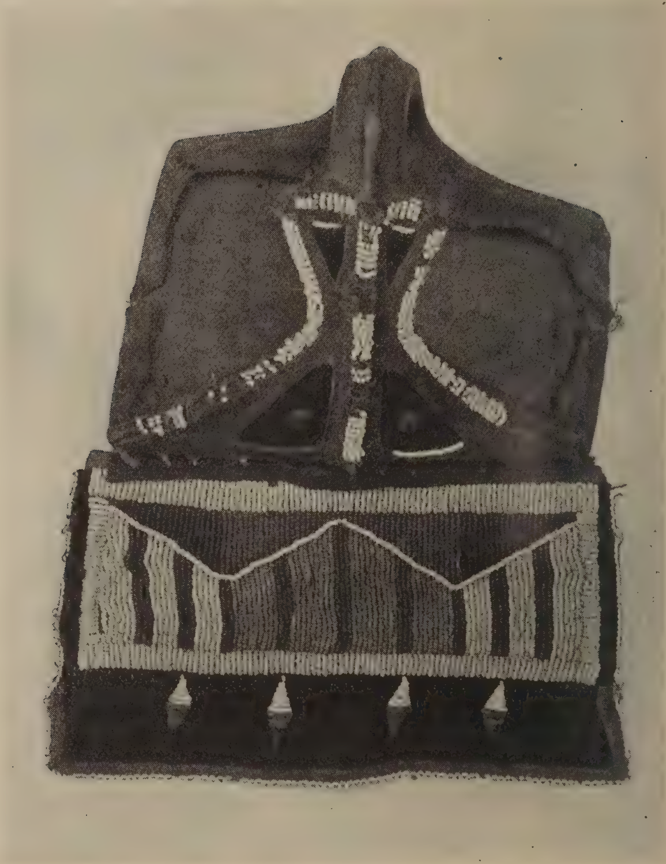

Fig. 22 (50.1–731b). Crow Stirrup.

Quirts and Ropes.

For completeness some account of driving appliances may be added. The use of a spur is rare, the only native-made specimen we have seen was from the Pima.

Quirts were universally of the same general pattern throughout. One common form is shown in Fig. 23. The lash is inserted in the butt where it loops over a wooden pin. The smaller end is pierced and provided with a wrist guard, or hanger. A number of wooden handles are found in the collections from the Kootenai, Blackfoot, and Dakota with the lash inserted in precisely the same manner, from which we infer that they are copies of the antler type. On the other hand, we note a number of larger flat club-shaped handles of wood with the lashes passed through a single transverse hole near the end as in Fig. 24. This illustration presents a special serrated form found chiefly among the Arapaho and Cheyenne. It is similar to the large ceremonial quirt carried in some forms of the grass dance. In the Southwest we sometimes find quirts of braided horsehair, but these are usually secured in trade.

One unusual specimen is of polished elkhorn (?) of the precise form shown in Fig. 25 and said to come from the Plains-Cree. Another striking handle is of carved wood and was collected in northeastern Oregon in 1882. It is probably from a Shahaptian tribe. It is doubtless copied from some other implement (Fig. 25).

Ropes were simple bands of buffalo hide or braided cords of hair or thongs.[1]

Bridles.

So far as we know, the Indian did not use a bit of his own manufacture and seldom a bridle or halter. He controlled his mount by a cord looped around the lower jaw.[2] There are a few bridles in the collection of native leather and bearing trade bits, but they are obviously copied directly from modern commercial types. Some of the bits are of historical interest for they are quite like old Spanish types and may be of respectable age. In the Metropolitan Museum there are dated specimens of 1787 similar to Fig. 26*a*. In the Hispanic Museum are some similar to Fig. 26*b* dated 1600.

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[1] This series, vol. 5, 96.
[2] This series, vol. 5, 96.

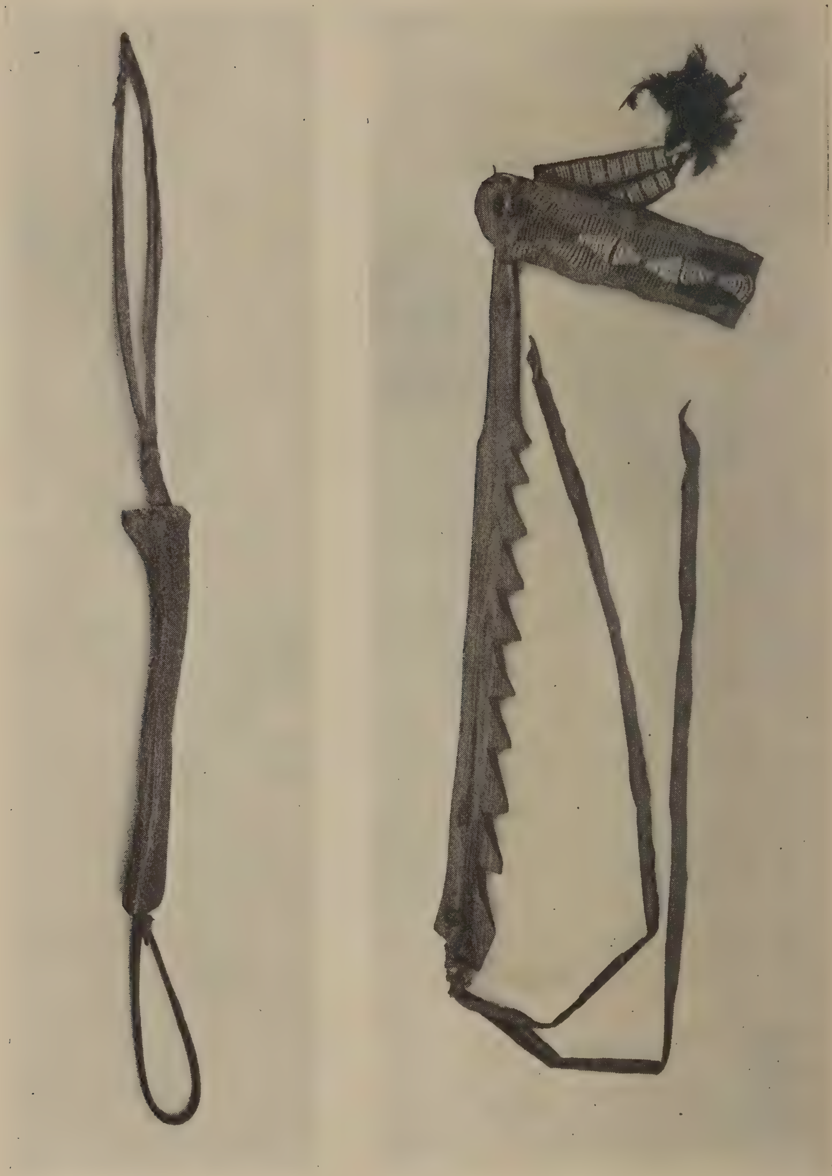

Fig. 23. Fig. 24.

Fig. 23 (50–5). Typical Plains Quirt. Blackfoot.
Fig. 24 (50.1–630). Wooden Handled Quirt. Cheyenne.

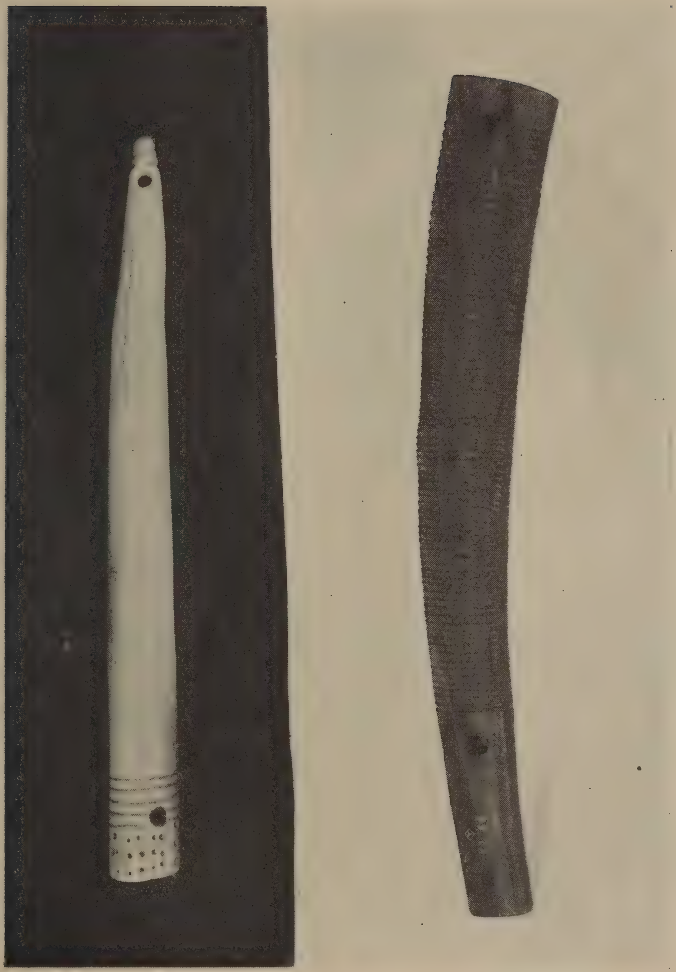

Fig. 25 (*a*, 50.1–7833; *b*, T–22150). Unusual Quirt Handles. *a*, polished antler; *b*, red cedar.

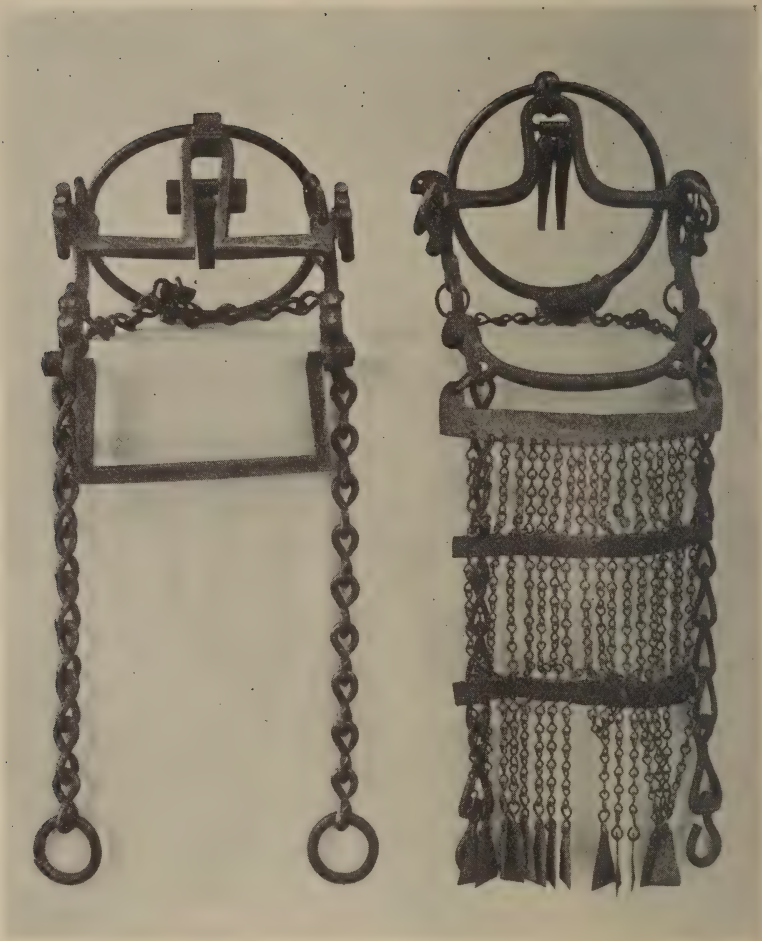

Fig. 26 (*a*, 50.1–6784; *b*, 50.1–726). Spanish Bits found among the Navajo and Crow respectively.

Distribution of Types.

In general, it appears that the saddles with high pommels as in Fig. 2 were used by women while men used either a pad or the low-bowed frame saddle. Yet, the pad was not exclusively for men, especially among the Dakota. So far as we have data, the highly decorated saddles of whatever model were used by women.

In the distribution of types one point is clear, the type of Fig. 2 is almost exclusively confined to the Ute, Shoshone, Shahaptian, and Crow. However, random specimens are found among the Blackfoot, Thompson, and other Salish and also among the Hidatsa who, no doubt, obtained them from the Crow. The stirrups of the Ute, Shoshone, and Crow, used by women, were also distinctive as to some details of form and decoration. Again, these are the people using the large decorated cruppers and collars, reminding one of types used in the days of knighthood. That these are not recent is made clear by Lewis and Clark, Cox, Franchère, etc. In late days we find the Navajo and the Southwest generally to incline decidedly toward trade models but that this was not formerly true is suggested by the illustrations in Whipple's report of 1855, showing Navajo riders with stirrups and saddles of the Shoshonean type.

Among the Comanche, Cheyenne, Arapaho, Dakota, Assiniboine, Mandan, and Cree, the frame saddles use bowed or y-shaped cantles and pommels of elkhorn. Farther east we find the Sauk and Fox, Winnebago, Menomini, and Caddo making a bow or rounded cantle of wood. According to Morgan this type was used by the Iroquois and certain remarks by Adair suggest the same style for the Southeastern tribes. Thus, we have the appearance of three geographical types ranging from south to north and radiating from the Mexican border. It is quite probable that these represent three different lines of diffusion for horse culture.

Now that our descriptive and analytic task has been performed we may turn to the problems leading to this preliminary work. The most fundamental problem is how the Indian came by the various elements of his horse culture complex. If we consider the mere possibilities of the case it is clear that having acquired the horse, he could have independently invented saddles, bridles, etc. On the other hand, it is also possible for him to have invented nothing whatever but to have taken over the whole complex from Europeans. Again, it is conceivable that we may find any degrees of compromise between these extremes in that some appliances were borrowed entire, some slightly modified, some more, some entirely original, etc. Since we cannot expect much in the way of definite historical

information on these points we must turn to the objective data in the preceding pages.

We have seen how surely the frame saddles were constructed according to one definite structural concept and how uniformly the three variants of this were distributed in geographical bands converging toward Mexico. In a former paper we have shown how the data for the diffusion of the horse was quite consistent with the conclusion that the source of Indian supply was Mexico and that the colonies of the Atlantic Coast were a negligible factor. It is therefore likely that definite structural concepts for riding gear came from the same source. The difficulty in this case is that we have so far no good data as to the types of saddles used by the Spaniards. Lewis and Clark give us an accurate description of the Shoshonean saddle and add that "it is made like the pack saddles in uce among the French and Spaniords."[1] Adair comments upon the same type among the Southeastern tribes as follows: "the shape of it is so antiquated and mean, and so much like those of the Dutch West-Indians, that a person would be led to imagine they had formerly met, and been taught the art in the same school."[2] In discussing the saddles of the Iroquois, Morgan says: "This is an Indian invention, but came originally from the west. It closely resembles the saddle of the native Mexicans in its general plan, but its pommel is not as high, and its side-pieces are longer."[3] Also, Franchère observed the Shoshone type on the Columbia River: "The saddles for women differ in form, being furnished with the antler of a deer, so as to resemble the high pommelled saddle of the Mexican ladies."[4] Noting that these observations cover almost a century preceding 1850 and are by men of wide experience in the country, we must give them great weight. They agree in asserting specific resemblances to southern types and on the whole Spanish types.[5] Mr. Mooney informs me that according to his data one of the chief reasons why the Southern Plains tribes took Mexican captives was that they were better skilled in the care of horses and in metal work. Doubtless this developed as an early concomitant of horse raiding and as such is a suggestion as to how directly all parts of the horse culture complex were taken over from Spanish settlements.

All these data are rather against any important inventions of the Indian;

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[1] Lewis and Clark, Original Journals of the Lewis and Clark Expedition (Thwaites Edition, New York, 1905), vol. 3, 31.

[2] Adair, James, The History of the American Indians, London, 1775, 425.

[3] Morgan, Lewis H., League of the Ho-de'-no-sau-nee or Iroquois, Rochester, 1854, 377.

[4] Franchère, Gabriel, Narrative of a Voyage to the Northwest Coast of America, etc. (Early Western Travels, Thwaites Edition. New York, 1854, vol. 6), 341.

[5] According to Col. R. T. Dodge, Our Wild Indians (Hartford, 1885), 338, the Indian cinched his saddle by the Mexican method.

but we must not overlook the fact that while we have a fine series of specimens from the Indians we have very little of the kind from the period of Spanish colonization. The modern Mexican saddle with its high pommel and horn appears to have had its counterpart in the days of the Conquest; in fact numerous native drawings appear in the later codices and a single sketch of a saddled horse in the Codex Baranda, Fig. 27. In these we see

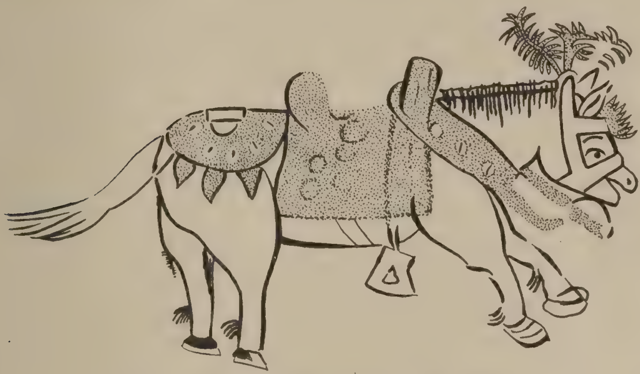

Fig. 27. Sketch found in the Codex Baranda.

the prominent pommels and cantles, the Shoshone type of stirrup, the wide crupper, and a collar like those of the Crow. The prevailing Mexican type of some years ago is said to have had a high pommel and a round-headed projecting cantle. The sketches of Southwestern Indians in Whipple[1] show a cantle that fits this description and which also has its prototype in our collections from the northern tribes.

In Europe the English have used a simple saddle for several centuries in contrast to the high pommel and cantle of the continent and this latter also seems to prevail still in Africa and Asia. The English colonies brought with them the small flat English saddle which has been the prevailing type east of the Mississippi but westward in the cattle country, the large Mexican type is still in use, with the lasso or rope, large spurs, etc. It is interesting to note how tenaciously the type introduced by the Spanish colonies and first diffused by the Indian, has held sway in the whole region west of the Mississippi. No doubt the same causes that tended to diffuse horse culture among the Indians operated with the American settlers in so far as they preferred to adopt a culture trait already in function rather than to devise

[1] Report upon the Indian Tribes (Reports, Explorations and Surveys, 1853–4, vol. 3, part 3, Washington, 1855).

a new one. Perhaps we have here a good example of how the environment may hold a culture trait to a certain area in spite of racial displacements.

It may be worth while comparing the horse culture of the South American Indian since it must also have been initiated by the Spaniards. The data at hand are meager enough but yet sufficiently positive. In Ratzel's "History of Mankind" (vol. 2, 82) are illustrations of the saddle, stirrup, bit, and spur used in Patagonia. The saddle is of wood but quite like the North American type, Fig. 5. The method of fastening the stirrup is the same. There is a good description in Wood's "Uncivilized Races":—

> The saddle is made of four pieces of wood, firmly lashed together with raw-hide thongs, and both the front and back of the saddle are alike. From the sides depend the stirrups, which are appended to leathern thongs, and are made in a very simple manner. A hole is made at each end of a stout leathern strap, and a short piece of stick about half an inch in diameter is thrust through them, being retained in its place by a groove near each end. The strap being attached by its middle to the thongs which act as stirrup-leathers, the article is complete.
>
> As the space between the grooves is rather less than three inches, it necessarily follows that the Patagonian horseman can only insert his great toe in the stirrup. This, however, is sufficient hold for him, as he is an admirable though careless looking rider, the greater part of his life, from childhood upward, having been spent on horseback.
>
> The spur is as primitive as the stirrup, and exactly resembles in principle the prick-spurs of the ancient knights.[1]

Of the Araucanians he says:—

> Their saddles are made very much after the fashion employed by the Patagonians, being little more than rude wooden frames. A few skins are laid on the back of the horse, the saddle is placed on them, a saddle cloth of thick brown leather is thrown over it, and the whole apparatus is complete. The bridle is made, like that of the Patagonians, of twisted hide, or sometimes of a number of strips of horse-skin plaited together, a few threads of silver being mingled with them. The bit is generally the ordinary Spanish bit, with its cruelly powerful arrangement of curb and ring.[2]

Somewhat vague but parallel accounts are found in Dobrizhoffer's Abipones, vol. 1, 235.

This data, fragmentary though it is, shows clearly that the same structural concept for saddles is found in South as in North America. The methods of attaching the stirrups is also the same, but in many parts of South America a small stirrup is used for the great toe. Yet certain remarks by Wood and Dobrizhoffer (vol. 1, 275) indicate that this was by no means

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[1] Wood, Rev. J. G., Uncivilized Races of Men in all Countries of the World, Hartford, 1876, 1173.

[2] Wood, *ibid*, vol. 2, 1196. Bits of this type are still in use in Central America and parts of Mexico.

universal. Of accessories we may note the Mexican cinch, the lasso, the primitive form of bridle and the ornamental collar.

We have previously discussed the method of mounting but some further data have come to hand. Col. Dodge says:—

> Civilized people mount on the left side of the horse, because the knights of old, from whom we get our ideas of horsemanship, wore their swords on that side, and could not, therefore, mount on the right without inconvenience from that weapon.
>
> The Indian mounts always on the right side, and this is undoubtedly natural and most convenient, as it leaves the left hand free to hold the reins and manage the horse, while the right grasps the mane or pommel of the saddle.[1]

It is stated that the Roman cavalry under Vespasian changed the sword from the right to the left side and also the method of mounting. So far as we can learn this was the custom from that time to the present among European nations. The Spanish cavaliers were no exception to the rule. Hence, the Indian did not learn the mount from the Spaniard. It is fairly clear that if men are left to their own devices they will mount from the right side, unless left-handed.[2] According to Dobrizhoffer the natives of South America mount from the right side (vol. 2, 113). Thus it is clear that the horse culture complex of the two continents is practically identical and is therefore best explained as having a common origin in Spanish colonies. The Indian therefore contributed next to nothing to this complex.

If we turn to the Old World we get the suggestion that outside of English influence, there was a uniform type of horse gear and that this has changed very little in historic times. Bits from the bronze age show the same fundamental types in use today and the wide distribution of the side-bar frame saddle suggests its antiquity. It is said that saddles were not used in Egypt and Greece and not by the early Romans. The frame saddle appears among the Romans about the fourth century A.D. Stirrups appeared late in Europe. The Romans adopted them about 100 A.D., but their invention is attributed to the Franks. Before the era of the frame saddle a padded cloth was used, no doubt similar to our Indian pad saddles.[3]

There is one factor in North America that may have modified horse culture, viz., dog traction. Unfortunately, no studies of dog culture have

---

[1] Dodge, *ibid*, 338–339.

[2] In a theoretical discussion of material culture (American Anthropologist, N. S. vol. 16, 494) the writer cited this mounting custom of the Indians as a possible effect of racial motor differences. At that time it was assumed that the difference between Indians and Americans was due to historical causes. The data now before us are consistent with that assumption, except that it is the American-European method of mounting that has a distinctly historical origin.

[3] Dobrizhoffer noted a similar type in South America, An Account of the Abipones, an Equestrian People of Paraguay, 3 vols., London, 1822, vol. 1, 275.

been made in the Plains area except G. L. Wilson's unpublished work among the Mandan-Hidatsa. This investigator's parallel study of horse culture shows very little direct transfer of one to the other in the care, rearing, and training of dogs. Castration seems to have been practised on dogs in prehistoric times and in this instance to have been transferred to horses with little or no change. On the other hand, the ritualistic procedures to train and properly rear horses seem to have little in common with the rituals for dogs. When we turn to the use of the horse and the appliances for the same, we note the example of the travois and methods of packing. According to Hendry[1] the Assiniboine in 1754 used their horses like dogs for transporting baggage but did not ride. Probably this was the first step among all tribes. We have previously discussed the historic importance of the substitution of the horse for the dog and how he passed directly into the burden-bearing complex already developed. It is probable that as there was no riding complex in dog culture, there was no resistance to taking over the whole Spanish complex.

Chronology.

It would be interesting to follow up the chronology of the introduction of saddles to see how closely it correlates with the diffusion of the horse, but our data are likely to be too meager. The earliest data we have for the extreme north is the journal of Hendry 1754–55. In one place he says of the Blackfoot:—

> Their horses are turned out to grass, their legs being fettered: and when wanted, are fastened to lines cut of Buffalo skin, that stretches along & is fastened to stakes drove in the ground. They have hair halters, Buffalo skin pads & stirrups of the same. The horses are fine tractible animals, about 14 hands high; lively and clean made. The Natives are good Horsemen, & kill the Buffalo on them.[2]

We have previously noted the evidence for the first appearance of the pad saddle in the north (vol. 5, 93). This may have been but a preference on the part of these northern tribes, for since they had the stirrup, halters, and ropes there is no apparent reason why they could not have used frame saddles also. On the other hand, the structure of the frame saddle is more complicated and demands considerable skill in working wood, an art not conspicuous in the Plains, hence, it may well be that the pad saddle was carried along with the horse while the frame saddle came northward at a slower rate.

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[1] Proceedings and Transactions of the Royal Society of Canada, 1, 351.
[2] Hendry, Anthony, *ibid*, 1, 338.

If we take a world wide view of our subject we are impressed with the uniformity of the frame saddle in Asia, Europe, and America. The only distinct variant is the English type. The history of the former is not clear but everything indicates a single origin. While we have a date for its appearance in Rome, its eastern distribution suggests that it was not invented there. The same may be said of the Franks as inventors of the stirrup. It seems far more probable that the earlier horse-using tribes of western Asia, who first appear on the scene with a distinct horse culture in contrast to ox culture contributed these now universal appliances.

We may then summarize this study as making clear that each appliance for riding and driving horses used by the American Indians was of one distinct structural pattern, which can be traced to the Old World. Since at the time of colonization the English had a different kind of saddle from that prevailing on the continent, we find in America two geographical types, which persist to the present. As the continental type appeared among the Indians in an unfamiliar setting, it was naturally considered as of Indian origin. By analyzing the structure of the Indian made appliances we have shown how accurately the respective structural concepts were diffused. This was shown clearly when we tabulated the measurements for our specimens. Thus, while the widths of frame saddles are to a large extent determined by the size of the horse, the length is far less so limited. Yet, our Shoshone saddles of the same precise pattern range from 50 to 52 cm.; Ute, 43 to 45 cm.; Menomini, 40 to 42 cm., Cheyenne, 41 to 49 cm.; Crow, 48 to 50 cm., etc. It is barely conceivable that these dimensions should be so uniform within a tribe without some chosen standard of measure. While there are here some tribal differences, it should be noted that the extreme variation recorded above is but 12 cm. When we consider that this uniformity throughout the Plains area was secured without the aid of a graduated system of linear measure, it is clear that a size type was also diffused.

Summary.

We may summarize the results of this study as follows:—

1. The Indian has shown no originality. He devised no important appliances for using horses. He manufactured his own saddles, bridles, etc., but followed precisely a few definite patterns. Though these patterns appear to us as Indian, that is because the English colonists brought with them the English saddle. The Indian model is fundamentally like that of Southern Europe and Asia during the period of American colonization and

still survives among the tribes of Patagonia. In general, the complete data will show that the greater part of the horse complex of the North American Indian was borrowed first by the tribes in contact with the Spanish settlements and then diffused as far as the Plains of Canada without loss or essential modification of detail.

The one striking Indian variation is the habit of mounting on the right side of the horse instead of the left as do Americans and Europeans. The comparative data on this point make it clear that if left to their inclinations right-handed people will mount from the right. Historical data show the European method to have been first introduced into cavalry tactics by Vespasian and to have survived to this day because the sword is worn on the left side. The difference, therefore, is not due to motor differences in the Indian but, like most other culture differences, to historical factors.

2. The Indian did not take the cart. Yet the Spanish colonists rarely if ever used the horse, mule, or donkey for anything but riding and packing; their carts were drawn by cattle. (The great abundance of buffalo no doubt prevented the development of an Indian cattle culture.) On the other hand, the Indian of the Plains had developed dog traction by the travois long before the horse came. When he got the horse, he fitted the travois to him. In any event, it is probable that the established use and simplicity of the travois would have inhibited the use of carts. Thus, while in the travois we have an instance of the use of an Indian invention with the horse, the presence of the horse had nothing to do with its origin.

3. The rapidity and completeness of horse culture diffusion in America is a good illustration of how fully traits of borrowed culture may be assimilated. In this instance we have sufficient data to determine the general lines of diffusion but such is not often the case. For example, maize culture was once diffused over a large part of North and South America, for the wild plant is found only in one area which must have been the place of origin. In the Old World the spread of horse culture was most likely strictly analogous to its diffusion in America. Returning to our problem, it will be seen how if a non-historical people had brought Old World horse culture to America, we should be puzzled at the similarities observed between these traits on the two hemispheres, but would probably set it down as another case of assumed independent invention. This investigation shows that the invoking of independent invention, to be more than a plea of ignorance, must rest upon specific data.

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COSTUMES OF THE PLAINS INDIANS

BY

CLARK WISSLER

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COSTUMES OF THE PLAINS INDIANS.

By Clark Wissler.

Preface.

The following study has as its chief object not so much the mere descriptions of certain types of garments among the Indians of the Plains as the presentation of a typical trait in material culture and the development of the problems involved. In a former paper on the *Material Culture of the Blackfoot Indians* some attention was given to the forms and distributions of men's shirts and women's dresses in order to determine the place of Blackfoot culture in the Plains group. This paper presents some of the results obtained by a far more intensive study of specimens from the Plains area as a whole. The specimens described are from the Museum's collections, particularly from the collection presented by J. P. Morgan in 1910; but the writer is under obligation to Dr. Walter Hough of the United States National Museum, A. C. Parker of the New York State Museum, C. C. Willoughby of the Peabody Museum at Cambridge, and to Dr. Fay Cooper Cole of the Field Museum of Natural History for equally important data from their respective institutions.

The structural analysis of the specimens was largely the work of my assistant, Mr. S. Ichikawa, who is to that extent a joint contributor. The drawings should also be credited to him.

August, 1915.

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Introduction.

The anthropological literature of some years ago gave considerable attention to problems in the development of industrial processes. The genetic relation of inventions as traits of culture were sought in a more or less world wide objective comparison. The order of the method was to retrace by logical analysis the steps by which a given technical process was developed. Thus, such arts as fire-making, stone chipping, pottery, etc., were intensively studied and their more complex forms analyzed to seek for the elemental or beginning processes, with the idea of ultimately reconstructing the evolution, or history, of each. Some years ago such studies were energetically pursued and consequently occupy a large place in the literature of that time. They finally came into some disrepute because of their extreme dependence upon the logical relations observed to the disregard of facts of geographical distribution and culture history. As soon as it appeared that the logical sequence as determined by the analysis of the process in question was not consistent with the geographical and other facts, confidence was lost in the method and a reaction set in toward the other extreme. The result is that for some years anthropologists have ignored the whole problem of the genetic or historical development of man's material culture. The problem is, of course, none the less real for that.

The following investigation was undertaken in the anthropological laboratory of the Museum with the view of raising anew the question as to the validity of the method of logical analysis. The subject chosen was the dress of the North American Indians of the Plains and adjacent territories. The method was to study intensively the types of dress and their structural processes in the Plains area and then to extend the study less intensively to the continent and to the world at large.

We shall base our discussion almost wholly upon two types of garment, the man's shirt and the woman's dress. The sharp contrast that now exists between the costumes of European men and women is not observable among primitive peoples, the rule is for the sexes to use the same fundamental pattern. Thus, if the men wear trousers, the women do also, although the cut may be different. It is chiefly owing to this that we can make effective use of the dress of both sexes among the Plains Indians. In passing, one may remind the reader that this difference in the degree of contrast between the costumes of men and women is not a distinguishing characteristic between primitive and civilized peoples for like most phenomena of cultures the European divergence in patterns has a definite historical explanation.

Fig. 1 (1–2721). A Nez Percé Shirt. Collected about 1865. The pattern is shown in Fig. 7*a*.

Fig. 2 (50.1–301). A Dakota Shirt. For pattern see Fig. 7*b*.

Fig. 3 (50–4277). A Gros Ventre Shirt. This is part of the regalia for the dog dance, see this series, vol. 1, 255. For pattern see Fig. 8*g*.

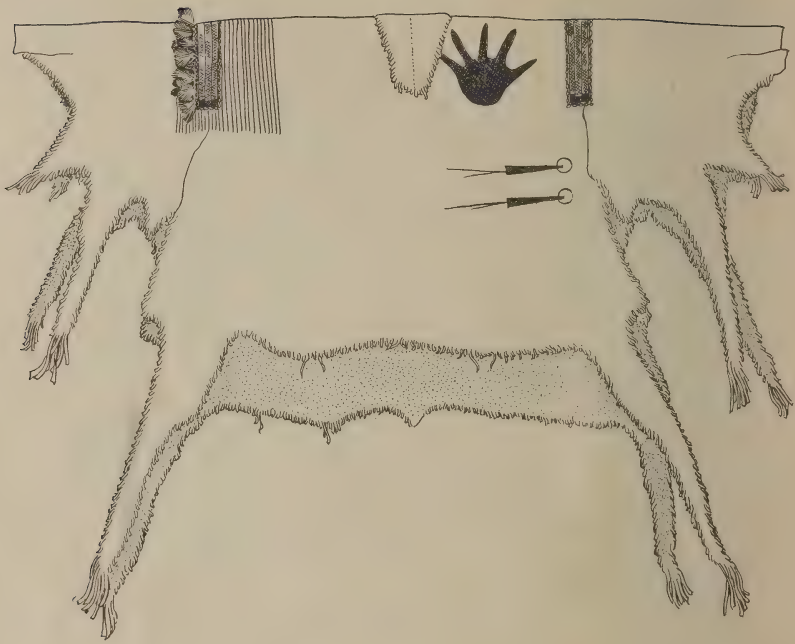

Fig. 4 (50–841). A Man's Shirt of the Poncho Type. This specimen is made of two deerskins. There are bands of quillwork over each shoulder, fringed on one side with crow feathers. On the opposite side of the fold is a transverse band of quillwork. See Bulletin of this Museum, vol. 18, fig. 95. The tail tuft is discernible on the lower edge and the dewclaws are still attached to the leg projections. Collected in 1838.

Men's Garments.

If one take a typical man's shirt of the Plains area and suspend it, the sleeve and shoulder line will be found horizontal and to coincide. In other words there is a neck hole, but no collar (Fig. 4). If on the other hand, one suspend a true coat (Fig. 11), the familiar European sleeve and shoulder cut is seen. This may be generalized by classing the former as of the poncho type and the latter as of the coat type.

First, we may note the structure of the poncho type. Fig. 4 represents a specimen collected about 1838. There is another old specimen in the Nez Percé collection (Fig. 1). A more modern specimen is shown in Fig. 2. A simpler but old and interesting specimen is Fig. 3. From these sketches the general pattern concept is clear. Two whole skins of mountain sheep or other ruminants are taken and cut as in Fig. 5. Thus, the peculiar contour of sleeve extensions, or capes, is explained as also that of the skirt (Fig. 6). The whole pattern of this type of shirt is seen to be correlated with the contour of the natural material, and it seems most probable that it was this form of the material that suggested the pattern.

The former distribution of this type of shirt cannot be precisely stated, but so far we have found it to prevail among the Dakota, Nez Percé, Gros Ventre, Blackfoot, Crow, Hidatsa-Mandan, Pawnee,[1] Assiniboin, Arapaho, Ute, Comanche, Kiowa, and Cheyenne. It occurs, but less universally among the Sarsi, Plains-Cree, and Ojibway on the north and on the south among the Apache and in the pueblo of Taos.

Our museum collection contains about forty shirts of this poncho type, all of which we have examined in detail. Among them we find many minor variations in pattern, but so far as we can see these are all adjustments to the coat type and to new materials and, hence, due to white contact. The tendency to use cow skins and cloth is very strong and in these materials the natural contour, the base of the pattern, is wanting. This is particu-

[1] "A jacket, made like a shirt, of beaver or otter skins, and ornamented with beads, was highly coveted, and was beyond the command of any but the privileged few. The finest article of Indian apparel I ever saw was one of these jackets made from four otter skins. The body was formed of two pelts, and each arm of one. The skin of the head, tail, feet and even the claws of all the animals were preserved intact in the garment, and the whole richly trimmed with beads. Similar garments were also made of fine cloth, fringed with swan's down, and heavily beaded." — Dunbar, The Pawnee Indians, Magazine of American History, IV, 280.

According to James R. Murie these shirts were so rare that they should be ignored, the fact being that Pawnee men did not wear upper garments of any kind, simply a robe.

larly noticeable in the cut of the bottom as shown in Figs. 7–9. In most cases this curve is simplified by dropping the tail projection in the center, observable in the older type, Fig. 7*b*, but in one Arapaho piece we find an interesting rectangular cut at the corresponding point, Fig. 7*e*.

A comparison of the tops of these sketches shows that the shoulder

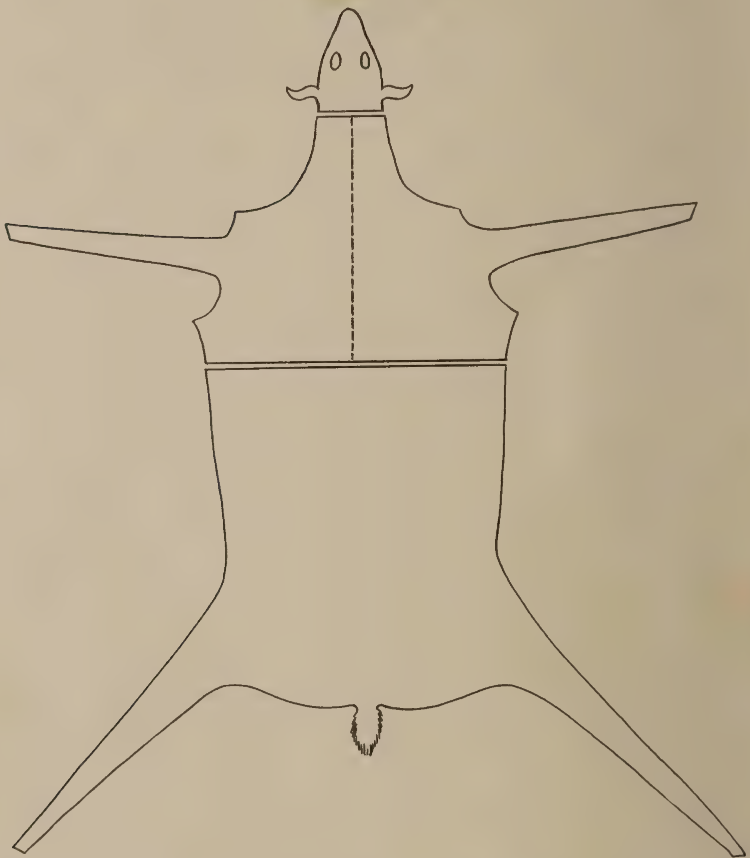

Fig. 5. Diagram showing how a Skin is cut and folded to make a Shirt of the Poncho Type.

extensions tend to become true sleeves and the sides of the shirt are often entirely or partially sewn up in which case a vertical cut is made on the breast at the neck without which it would be next to impossible to get into the garment. The older ponchos have neither fronts nor backs, both sides being alike, but many of the modern variants have a distinct front. It is

chiefly these variations in association with slight inessential modifications calling to mind features of European shirts that suggest that we have in Fig. 7*a* and 7*b* the original type of poncho for men in the Plains area.

This is further reinforced by a study of sleeve forms which in the older skin specimens follow the patterns of Figs. 7*a* and 7*c*. The sleeve pattern of Fig. 8*i* is found most often in cloth and distinctly modern skin pieces.

So far we have concerned ourselves with the pattern alone, but the most characteristic features of these ponchos are decorative. In all specimens of the older type these take approximately the same forms. The most conspicuous of these features are the broad beaded or quilled bands. These

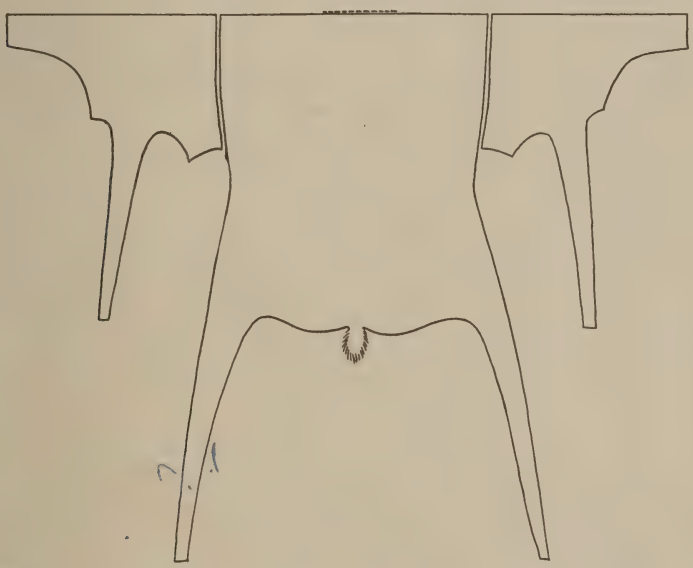

Fig. 6. Diagram showing the Arrangement of Pieces cut from the Preceding.

are made on separate strips of skin and readily detached from the shirt. From each side of the neck a band runs along the shoulder seam almost to the ends of the sleeves. At right angles to this so as to fall over the shoulders like suspenders are two other bands, one for each side. At the neck, both front and back, are triangular flaps also bearing beaded and quilled decorations. The edges of these bands are often strung with rows of feathers, strips of white weasel skins or human hair. It is due to the latter that these ponchos are often called "scalp-shirts." In the older types particularly, the edges of the body and sleeves were notched and fringed. These characteristics were almost universal but there are in addition, tribal

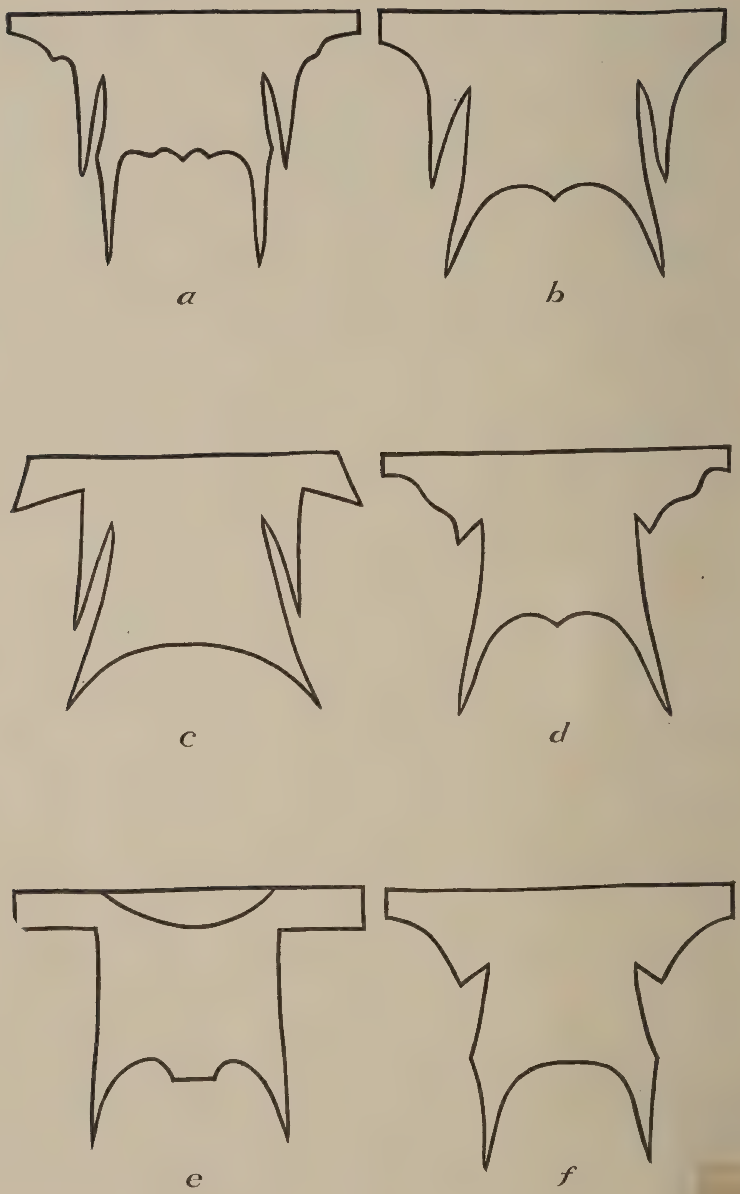

Fig. 7 (1–2721, 50.1–301, 50.1–1186, 1–2712, 50.1–37, 50.1–653). Shirt Patterns for Men: *a* Nez Percé; *b* Dakota; *c* Dakota; *d* Nez Percé; *e* Arapaho; *f* Crow.

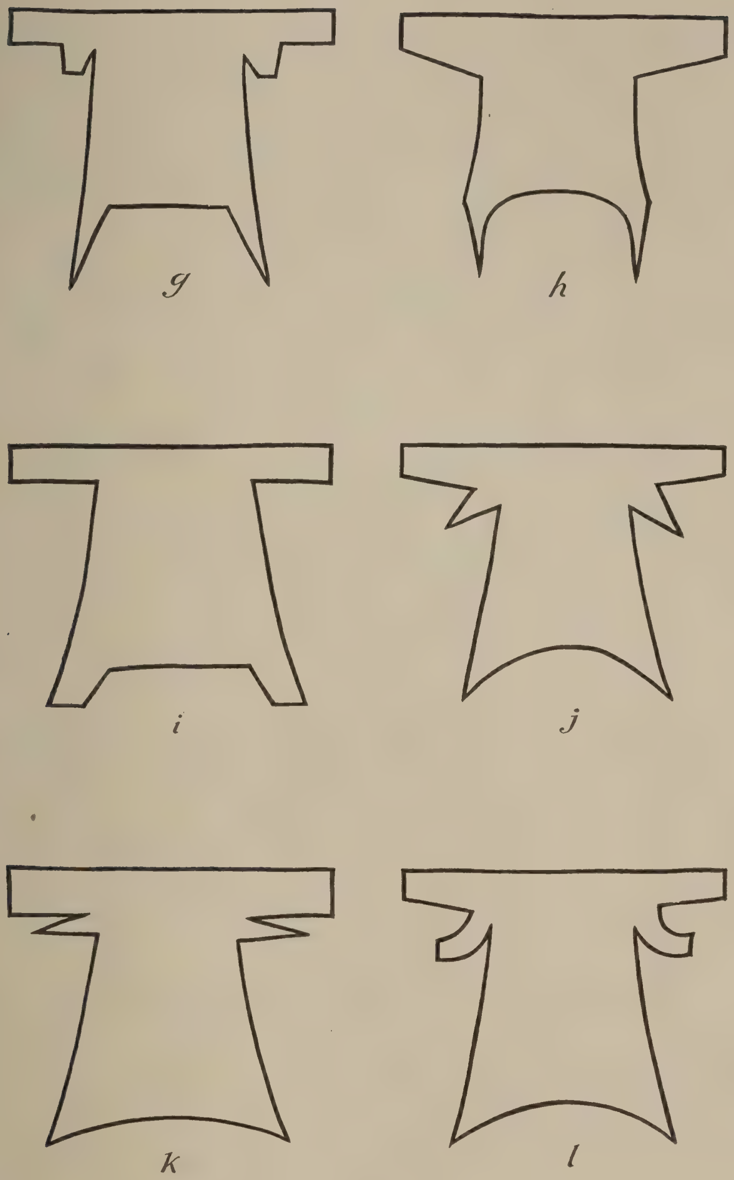

Fig. 8 (50–4277, 50–7863, 50.1–304, 50.1–761, 50.1–7370, 50.1–7212). Shirt Patterns, continued: *g* Gros Ventre; *h* Dakota; *i* Dakota; *j* Arapaho; *k* Ojibway; *l* Cheyenne?.

and regional decorations. Thus, many Blackfoot ponchos bear large circular designs on the breast and back. According to Maximilian, this was formerly common among the Assiniboin and a few other northern tribes. Dakota ponchos in particular, are frequently painted in two ground colors, bearing heraldic devices. The beaded or quilled bands have tribal peculiarities also. In another paper of this series we shall consider the probable origins of these various decorations.

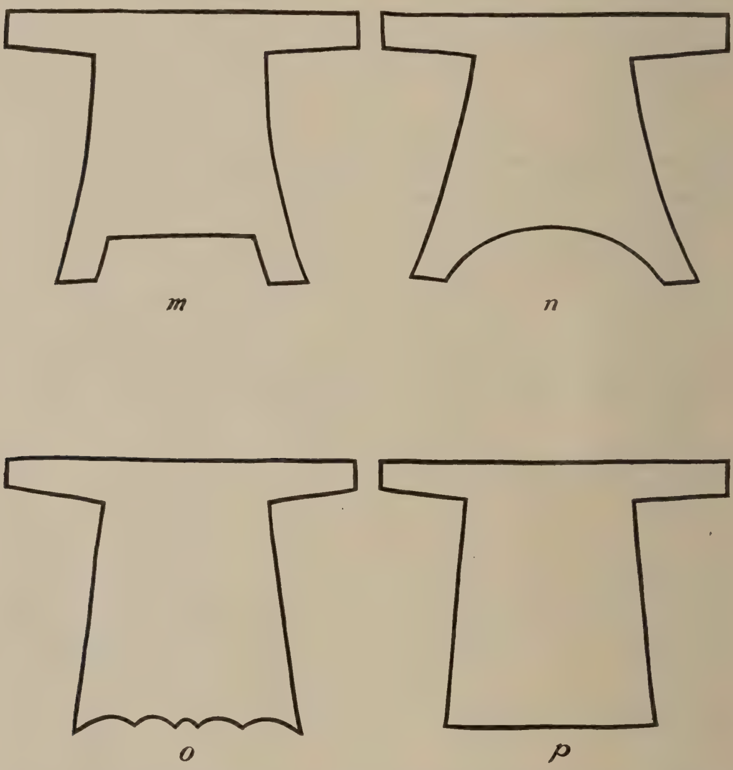

Fig. 9 (50.1–1303, 50.1–1301, 50.1–6321, 50.1–926). Shirt Patterns, concluded: *m* Apache; *n* Cheyenne; *o* Kiowa; *p* Pawnee.

Returning to the coat-like features of the more modern forms of poncho, we may be reminded that the coat form is not necessarily of European origin. The Eskimo and most Déné tribes cut a coat-like garment that fits the neck and shoulders and has sleeves, but the best known and most distinctly coat-like form is that of the Naskapi, Fig. 10. Here the pattern is most clearly cut to fit the human form as in European tailoring. With

slight variations this pattern extends through the Cree to the Rocky Mountains and thence to the Salish of British Columbia. It even dips into the Plains as shown in the old Gros Ventre specimen (Fig. 12).

The garments of the western Déné area are not very well known, but in Alaska some of the modern natives wear a coat with flaring skirts like the Naskapi and certain Siberian styles. It is therefore probable that the Naskapi form is aboriginal and not due to European influence. Thus, in certain Iroquois skin coats we find a clear attempt to cut a close-fitting garment, suggesting the styles of colonial days (Fig. 13). Some other skin coats in the collection are cut in a simpler pattern, but still show the same intent. If we compare these with the Naskapi pattern the difference is clear, for here a large piece of skin is taken for the back and two for the front.[1] The flaring effect is produced by one or more triangular inserts. In many Iroquois coats there is a cut down the median plain of the back, a feature noted in the coats of many eastern Algonkin tribes and some of the Déné. On the other hand, the Naskapi mode of side seams is noted among the Sarsi, Ojibway, Menomini, Winnebago, and Penobscot. It seems therefore that the poncho form and the Naskapi coat form have their parallels among other tribes, but that in contrast to these we have a decidedly European-like cut of coat extending from the Iroquois through Canada to the Salish.

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[1] The Naskapi winter coat is usually sewed up in front. We find that a whole skin is taken for the back piece, the tail at the bottom, and the sides trimmed to give a waist and the flaring skirt. The neck piece forms the pendant collar and the sides are pierced to give the shoulder lines. The front of the coat is of a whole skin like the back, but cut down through the middle. In the coats with sewed up fronts this is curious, because the maker cuts the skin in halves and then sews it up again.

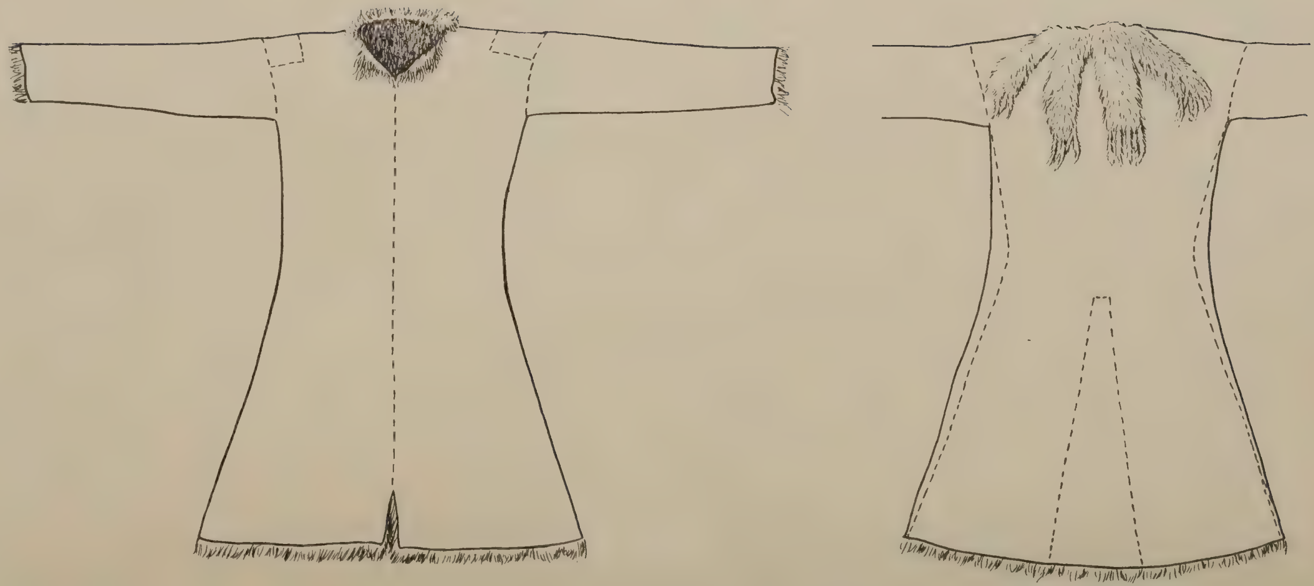
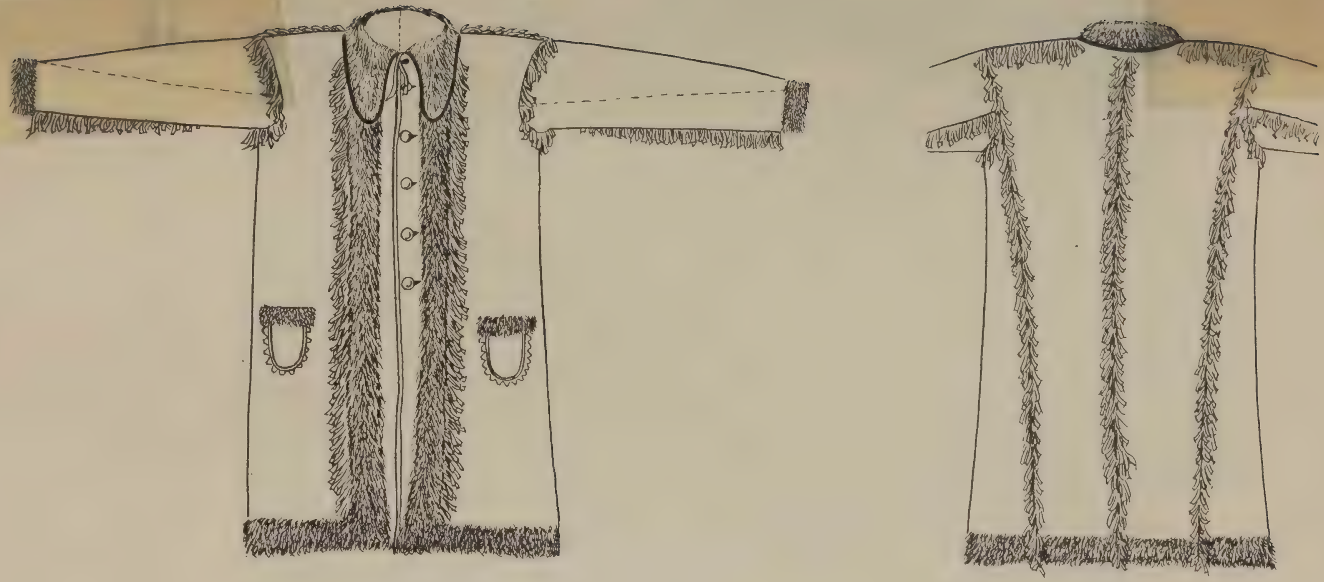


Fig. 10 (50–1721). Pattern of a Naskapi Coat.



a *b*

Fig. 11 (16–4576). Man's Coat of Deerskin, Thompson. In this specimen we have clearly the tailoring lines of the European Coat.

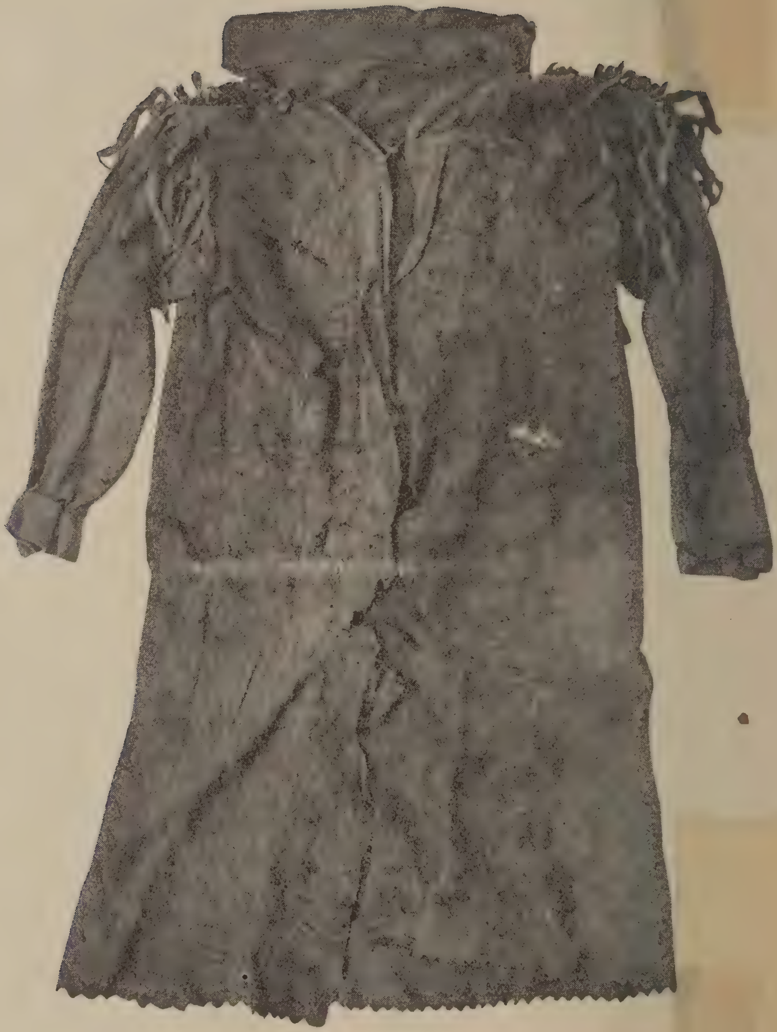
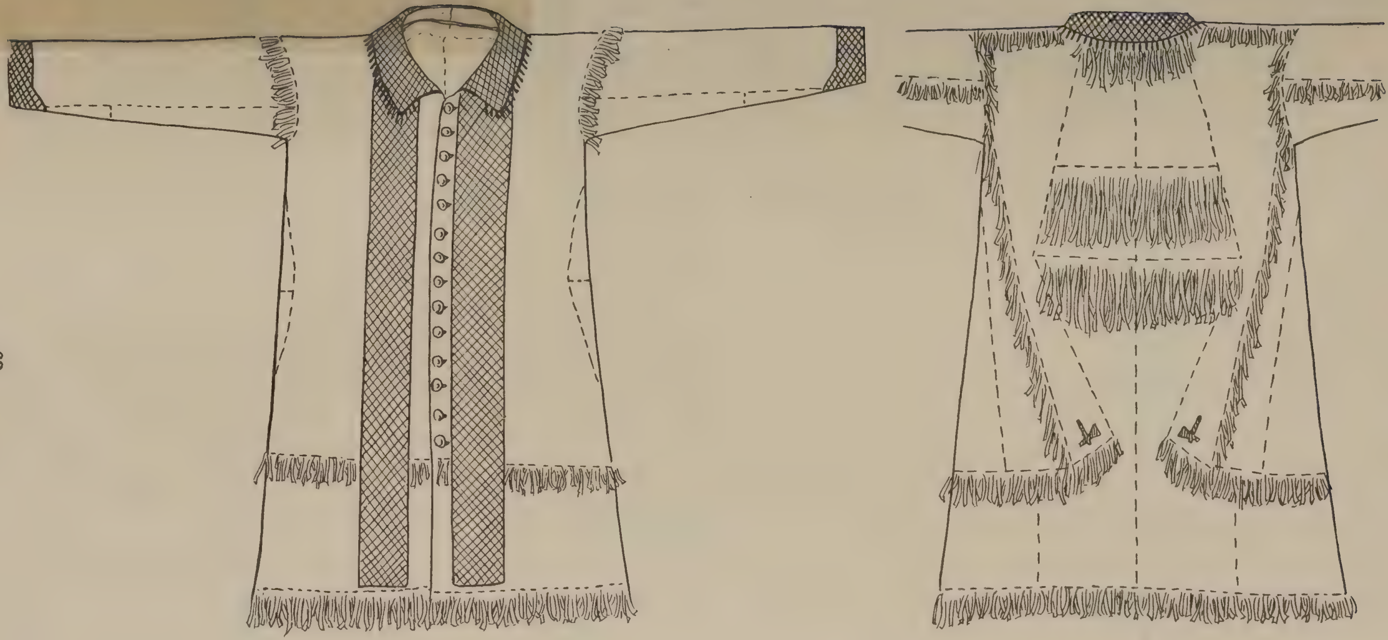


Fig. 12 (50–1924). Man's Coat, Gros Ventre. An old specimen made of dressed buffalo skin. The pattern is simple, the body being a single piece of skin. In addition to the attached collar the coat is composed of but three pieces.

Fig. 13 (50.1–1775). Man's Coat of Deerskin, Onondaga.

Fig. 14 (50–6532). Man's Coat of Deerskin, Cayuga, collected by M. R. Harrington, 1907. This is a unique example of tailoring skill, for a boy's coat was split down the back, pieces inserted, and a skirt added. The beaded tomahawks were formerly the tail ornaments of the small coat. Notwithstanding its composite pattern, the lines of the body have been closely followed. Worn by William Henry Fishcarrier, a Cayuga chief. Photographed with coat, Plate LXIV, Twenty-first Annual Report, Bureau of American Ethnology.



a b

Fig. 15 (50–6532). Pattern for Preceding Coat.

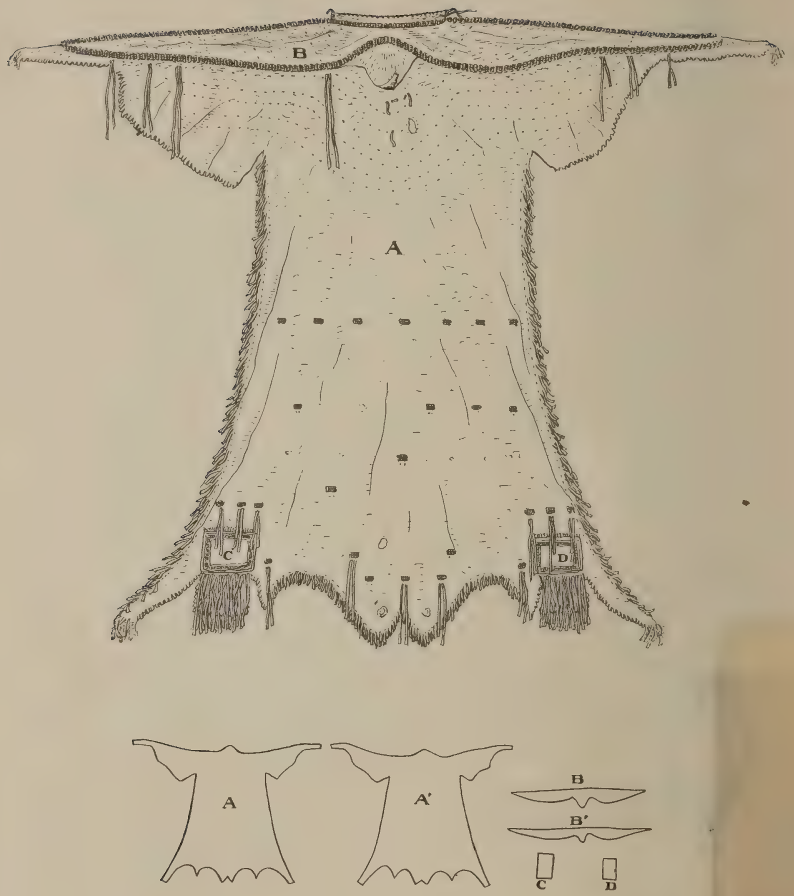


Fig. 16 (50.1–654). A Woman's Dress, Crow. An entire elkskin is taken for each side. A cape-like yoke is formed of two pieces as above, and sewed in place. The tail projection on *b* hangs loosely over a corresponding one on *a*.

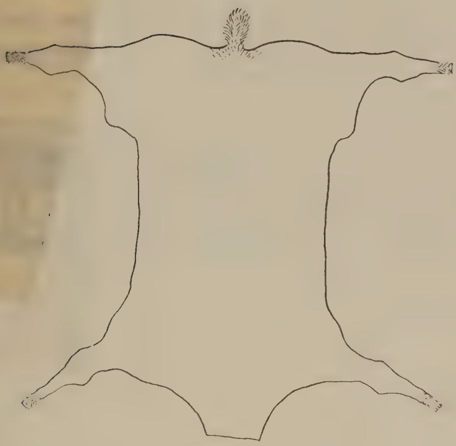


Fig. 17. Contour of an Elkskin. In tanning, the hair is left on the tail and the feet. Two of these skins are required to make a dress. See Figs. 16 and 18.

Women's Garments.

The costume for women is in its fundamental technique similar to that for men. Taking a Crow specimen as the type (Fig. 16) we see that three pieces of skin are used: an inserted yoke and two large pieces for the skirt. The sides are sewed up from the bottom of the skirt almost to the cape-like extension at the shoulders. There are no sleeves, but the cape-like shoulder piece falls down loosely over the arms. The side seams and the bottom and all outer edges are fringed. The garment has neither front nor back, both sides being the same.

The technical concept is again a garment made from two whole skins, in this case, elkskins. A dress is formed by placing two whole skins face to face, the tail ends at the top, the head at the bottom. The neck is fitted and the yoke formed by the insertion of a transverse piece of skin. Very little trimming is needed to shape the sides of the skirt.

The distribution of this pattern concept so far as we were able to determine by the study of specimens is: Arapaho, Assiniboin, Apache, Blackfoot, Crow, Cheyenne, Comanche, Dakota, Gros Ventre, Hidatsa, Kiowa, Nez Percé, Northern Shoshoni, Plains-Cree, Sarsi, Ute, Yakima.

We come now to the consideration of variations in the pattern. While the fundamental form holds throughout the above distribution, there are a number of distinct cuts for the contour of the yoke and the bottom of the skirt. Yet, there is very little variation within the tribe, it is truly surprising how precisely each of the tribes we have studied followed a definite

form for the bottoms of their dresses, making it clear that they had a fixed mode, or style for the cut. This will be more fully discussed in another connection.

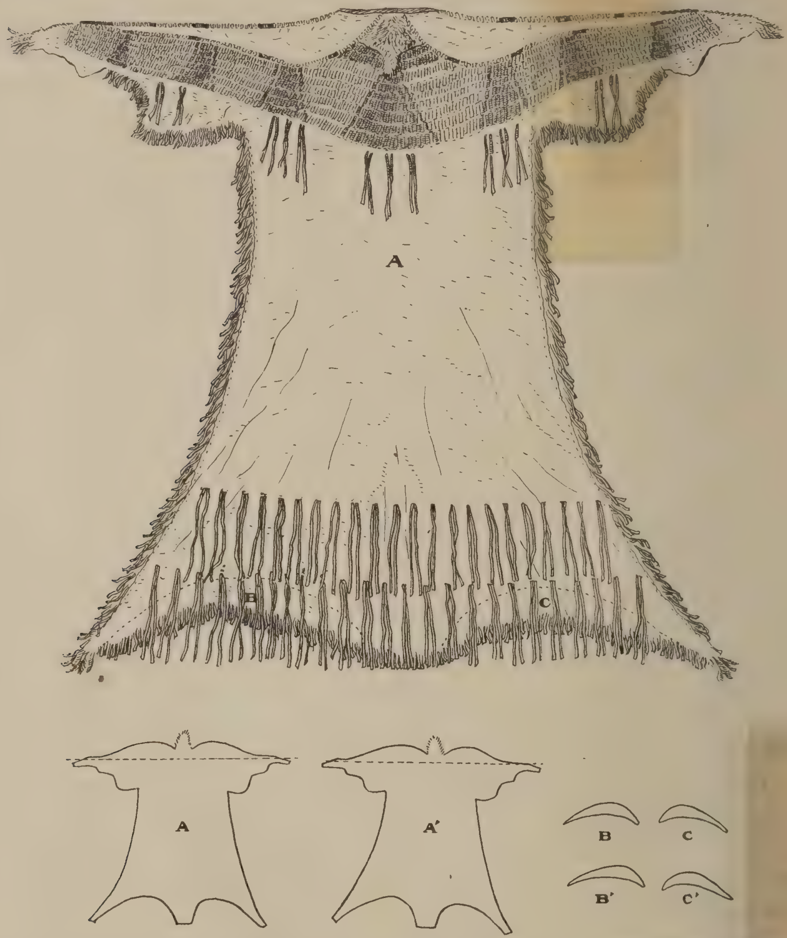


Fig. 18 (50.1–1965). A Woman's Dress, Yakima. The pattern differs from the preceding in that there is no insert at the top, merely a folding over as indicated. Separate curved pieces are inserted at the bottom to give the required contour.

European trade brought within the reach of these tribes the finest of cloth. A special quality known as strouding was always popular and from the very first was substituted for skins in making garments. This new material had a shape of its own and consequently presented a new problem to the Plains dressmaker. One example is shown in Fig. 21. A more common way was to take a rectangular piece of cloth, cut a neck hole in the

middle, join the sides by triangular inserts and add shoulder extensions. In many cases the bottom of the skirt is cut out to conform to the old style. Thus it is clear that the original two skin concept was able to prevail over the introduction of new materials.

When we turn to ornamentation we find these dresses quite decorative. In contrast to men's ponchos, we find the tail of the elk falling in the center of the breast, but like them in the tendency toward horizontal decorations with quills and beads. While there is considerable tribal variation in decoration, the general tendency is to bead or quill more or less completely the entire yoke. The edges of the yoke and the skirt are usually fringed and sometimes the latter faced with a narrow band of beads. Upon the body of the skirt will be found a varying number of pendant thongs. Among the Blackfoot symbolic devices of red cloth are often found near the bottom of the skirt and similar attachments are noted on some Sarsi, Crow, and Assiniboin dresses.

Historical Relations.

One general problem arising from this study is the historical relations between the several varieties of costume which in turn naturally leads to that other question as to whether structural similarities can be taken as evidence for genetic relationship. The subject may be best presented by reviewing the literature now available.

West of the Plains Area we have a large extent of territory in which no upper garment of this kind appears. The men tend toward nudity while the women wear a short skirt. The upper garment usually takes the form of a cape or is simply a robe. This is the case in California and some parts of the Shoshonean area but on the whole the Shoshonean tribes incline toward the types we have described. In the Columbia River region and northward, particularly among the Salish, we again find the poncho types of the Plains. The data furnished by Teit for the Thompson, Shuswap, and Lillooet are sufficiently detailed to permit of an analytic comparison. In the first place we find the poncho shirt for men.[1] The most distinctively poncho in type is a Thompson specimen, (16–1057, Teit, Fig. 162), made from a single piece of buffalo skin. There are no sleeves and the bottom is cut square; the sides are laced somewhat as in Plains shirts, but the neck is different. There is a circular neck hole with a vertical slit on the breast and a collar is set on the edges of the hole. This we are assured was the

[1] The Thompson Indians of British Columbia (Memoirs, American Museum of Natural History, vol. 2, part 4, New York, 1900).

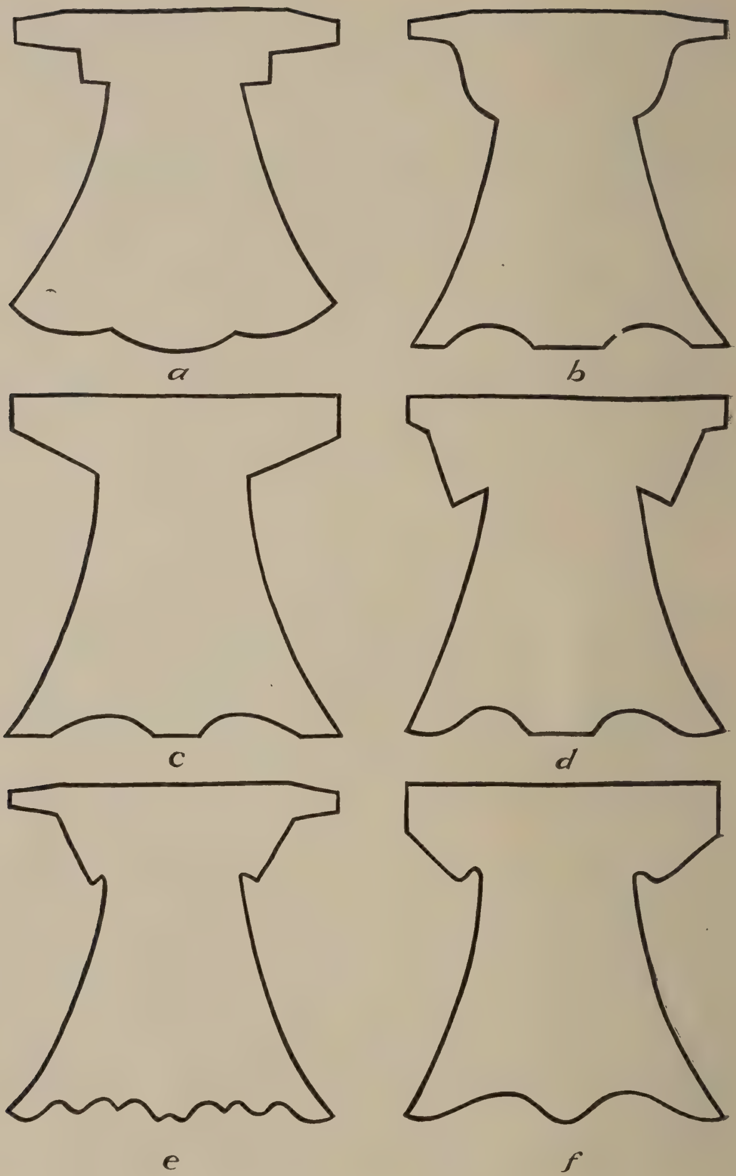


Fig. 19. Dress Patterns: *a* Yakima; *b* Nez Percé; *c* Blackfoot; *d* Sarsi; *e* Crow; *f* Assiniboin.

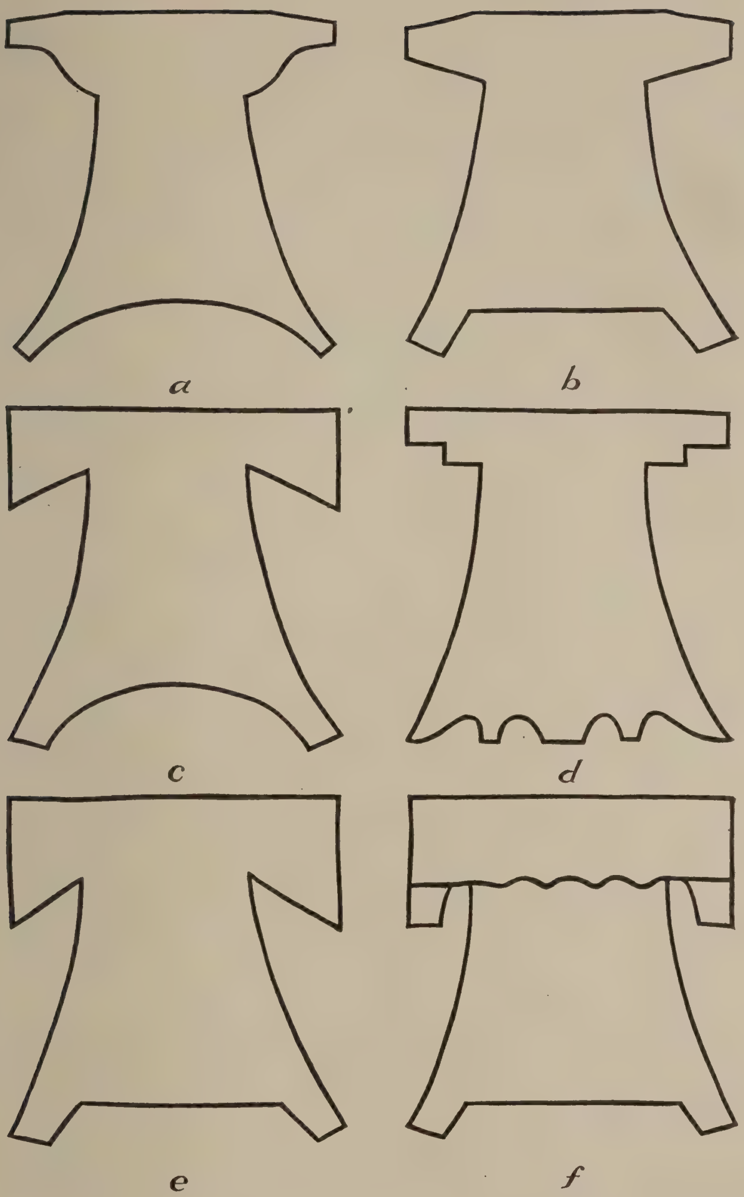


Fig. 20. Dress Patterns, continued: *a* Dakota (an alternate pattern is shown in Fig. 27); *b* Cheyenne; *c* Shoshoni; *d* Ute; *e* Arapaho; *f* Kiowa.

style for the buffalo skin shirts. On the other hand, there were buckskin shirts made of a single piece but with short sleeves (Fig. 163, Teit). In these again we have a circular neck hole but no collar. There is yet another type of man's upper garment, a true coat, previously noted. The cut of the neck is again as in the ponchos. Thus, the one distinctive feature in Thompson ponchos and coats is the cut of the neck, it being to all intents a coat cut and even in ponchos often fitted with a collar.

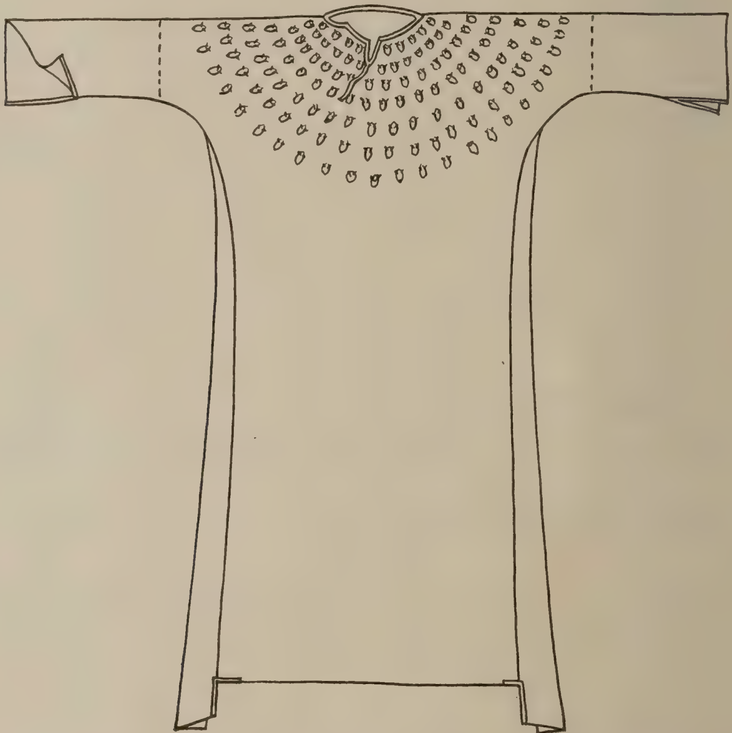


Fig. 21 (50.1–314). Dress of Blue Strouding, Brulé. Most cloth dresses in the Plains are similar in pattern. The front and back may be one piece with a hole cut for the head. The sides may be trimmed, but usually they are not. Angular pieces are inserted at the sides.

One other man's garment should be noted. The entire skin of a wolf or other animal was often worn over a poncho or coat, not so much as an extra protection as for ceremonial purposes.

The women of the Thompson wore a shirt-like dress with sleeves cut very much like the man's coat. It was open on the shoulders and laced there. The bottoms were square cut. As an under garment they wore a shirt of woven materials or a buckskin bodice.

This introduces us to another feature of Thompson clothing, the weaving of bark and hair. Garments of this material were confined to skirts and capes. Where, as among the Lillooet and Lower Thompson, they were in general use (Teit, 219), skin ponchos and coats were rare. As the weaving of bark and hair is widely distributed in this area and is practically universal among the Salish, it seems most likely that the skin poncho and the coat are due to influence from the east. We failed to find close structural parallels, however, between the Plains type and these skin garments, they being more like the coat type of the north. Yet Teit states that,

> The shirts worn by the men reached halfway to the knees, and were generally made of two doe or buck skins sewed together (necks down). The sleeves were wide, and the neck was furnished with a lacing. The hind-legs of the skin formed the sleeves; and along the entire length of the back of each was a fringe of cut skin, this being the only ornament.[1]

This is essentially the structural concept of the Plains. Again, the same writer says of the Shuswap: —

> Some women's shirts had wide sleeves and two flaps turned down from the neck which reached to the middle of the chest and back respectively. These flaps were cut in various shapes but most commonly they were square. They were fringed along the bottom, and ornamented with quills, beads, and shells.[2]

Here also we have what reads like the accounts of the Plains-Cree.[3] It also reminds one of the dress now found among the Apache in the south. All this makes it clear that the structural concept of the Plains must have been in at least partial use among the Salish, along with the coat concept. We see, however, that underlying these forms were the much more common garments of woven materials following patterns of their own.

Turning now to the east, we find another important variant among the Plains-Cree and some of the Ojibway, our data taking us back to the period of first exploration.

For the Cree we may quote from Mackenzie: —

> The coat, or body covering, falls down to the middle of the leg, and is fastened over the shoulders with cords, a flap or cape turning down about eight inches, both before and behind, and agreeably ornamented with quill-work and fringe; the bottom is also fringed, and fancifully painted as high as the knee. As it is very loose, it is enclosed round the waist with a stiff belt, decorated with tassels, and fastened behind.

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[1] Teit, *ibid.*, 206.

[2] Teit, The Shushwap Indians (Memoirs, American Museum of Natural History, vol. 2, part 4, New York, 1909), 502.

[3] Harmon, D. W., A Journal of Voyages and Travels in the Interior of North America, New York, 1904, 275.

The arms are covered to the wrist, with detached sleeves, which are sewed as far as the bend of the arm; from thence they are drawn up to the neck, and the corners of them fall down behind, as low as the waist.[1]

Harmon[2] gives a somewhat fuller statement, but one that is curiously like that of Mackenzie: —

The shirt or coat, which is so long as to reach the middle of the leg, is tied at the neck, is fringed around the bottom, and fancifully painted, as high as the knee. Being very loose, it is girded around the waist with a stiff belt, ornamented with tassels, and fastened behind. The arms are covered as low as the wrists with sleeves, which are not connected with the body garment. These sleeves are sewed up, as far as the bend of the arm, having the seam the under side; and extend to the shoulders, becoming broader toward the upper end, so that the corners hang down as low as the waist. They are connected together, and kept on, by a cord, extending from one to the other, across the shoulders.

Again we have the statement of Henry: —

The shift or body-garment reaches down to the calf, where it is generally fringed and trimmed with quill-work; the upper part is fastened over the shoulders by strips of leather; a flap or cape hangs down about a foot before and behind, and is ornamented with quill-work and fringe. This covering is quite loose, but tied around the waist with a belt of stiff parchment, fastened on the side, where also some ornaments are suspended. The sleeves are detached from the body-garment; from the wrist to the elbow they are sewed, but thence to the shoulder they are open underneath and drawn up to the neck, where they are fastened across the breast and back. — Journal of Henry and Thompson, 514.

Grinnell[3] says of the Blackfoot: —

The ancient dress of the women was a shirt of cowskin, with long sleeves tied at the wrist, a skirt reaching half-way from knees to ankles, and leggings tied above the knees, with sometimes a supporting string running from the belt to the leggings. In more modern times, this was modified, and a woman's dress consisted of a gown or smock, reaching from the neck to below the knees. There were no sleeves, the armholes being provided with top coverings, a sort of cape or flap, which reached to the elbows. Leggings were of course still worn. They reached to the knee, and were generally made, as was the gown, of the tanned skins of elk, deer, sheep, or antelope. (196).

In early times the Assiniboin women are said to have dressed like the Cree (vol. 5, 137).

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[1] Mackenzie, Alexander, Voyages from Montreal, on the River St. Lawrence, through the Continent of North America, to the Frozen and Pacific Oceans, in the years 1789 and 1793, etc., London, 1801, XCIV.

[2] Harmon, *ibid.*, 275.

[3] Blackfoot Lodge Tales, New York, 1903.

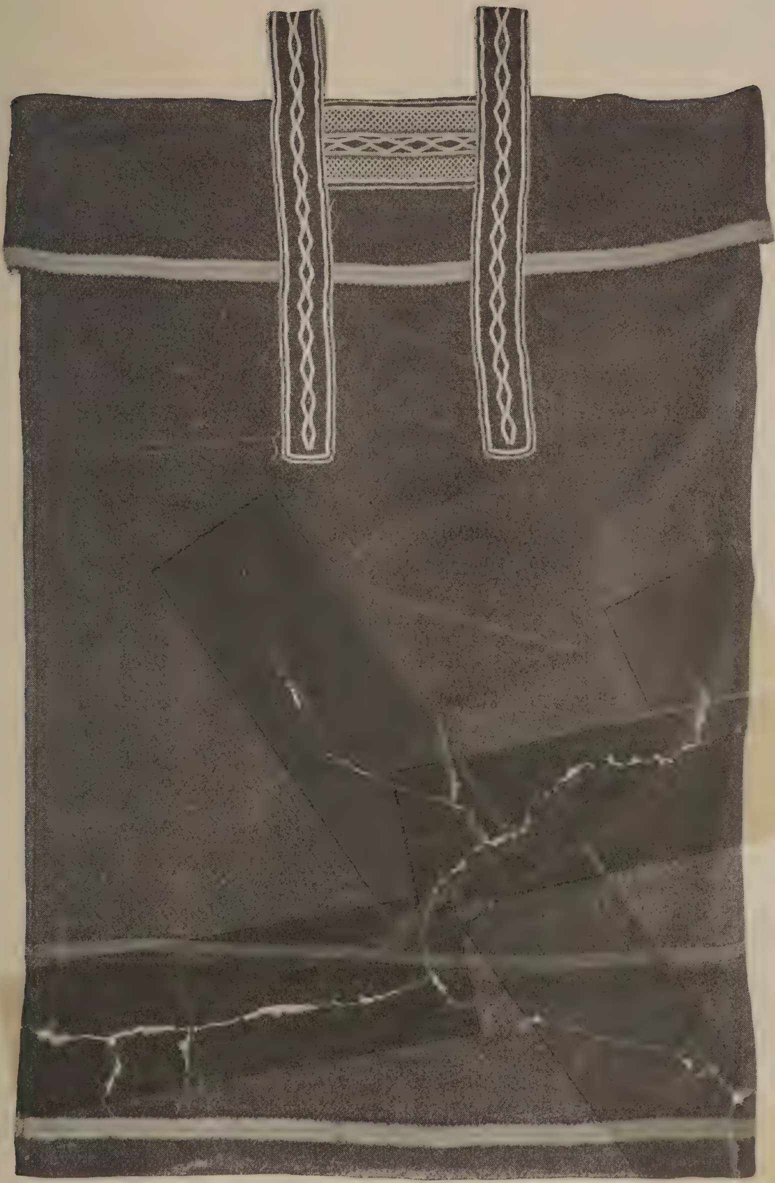

Fig. 22 (50.1–7369). A Cloth Dress, Plains-Ojibway, Cowesses Reserve, Saskatchewan. The front and back are the same, the garment hanging from the shoulders by the decorated straps. In this case a modern calico sleeved waist was worn as an upper garment.

Fig. 23. A Cree Dress in the Field Museum of Natural History. The material is deerskin throughout. The skin is folded over at the top and on the shoulders there are laces. Collected in Manitoba.

For the Eastern Dakota we have the early account of Carver [1] which is not so explicit but is supplemented by a drawing: —

> Such as dress after their ancient manner, make a kind of shift with leather, which covers the body but not the arms. (229).

In the illustration the women's upper garment appears to be joined over the shoulders, possibly by straps.

It is clear that all these observers are reporting upon the same general type of costume which possesses new features as the detached cape-like sleeves, the shoulder straps, and the turned down flaps. A specimen of this type from the Ojibway, though somewhat modernized, will be found in Miss Densmore's volume on Chippewa Music (II, 223). Here we find the separate sleeves and a skirt held up at the shoulders by straps. It is also stated that formerly a blanket was taken for the skirt and the surplus length folded down at the breast upon which decorations were placed.[2] This tallies very well with the remarks of Harmon and Henry and is thus readily identified.

In 1913 Mr. Skinner observed a Plains-Ojibway (Manitoba) woman wearing a cloth skirt of this form, Fig. 22. The shoulder straps and the intervening flap are decorated. Instead of the detached sleeves, she wore a simple calico waist cut like a modern shirt. It was ascertained, however, that formerly detached sleeves were worn with these skirts. There is a similar cloth skirt in the Museum's Penobscot collection but without the shoulder bands or the ornamental flaps. Again at Lake St. Joseph, Mr. Skinner collected a complete skin costume in this style, (Figs. 24–25). Here we see the turned down flap in front and behind.

Dr. Hough informs us that in the Turner collection at the United States National Museum there is a doll from the Nenenot dressed in this type of costume. The Field Museum of Natural History has a dress from the Plains-Cree which is also of this type, (Fig. 23). In this we see the detached sleeves extending over the shoulders to the neck. The dress is open across the entire top and laced at the sides. The turned down flap noted by early observers is here also.

It is well to note the structural peculiarity of this type, for instead of the coat-like shirt of some Salish we have an upper garment reduced to a pair of large sleeves extending over the shoulders to the neck and held together only by a string, while the skirt is almost full length and held above the breasts by shoulder straps, instead of being hung to the waist.

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[1] Carver, John, Travels through the Interior Portions of North America in the years 1766, '67, and '68, London, 1781.

[2] Also Plate 17 in Schoolcraft, part 5.

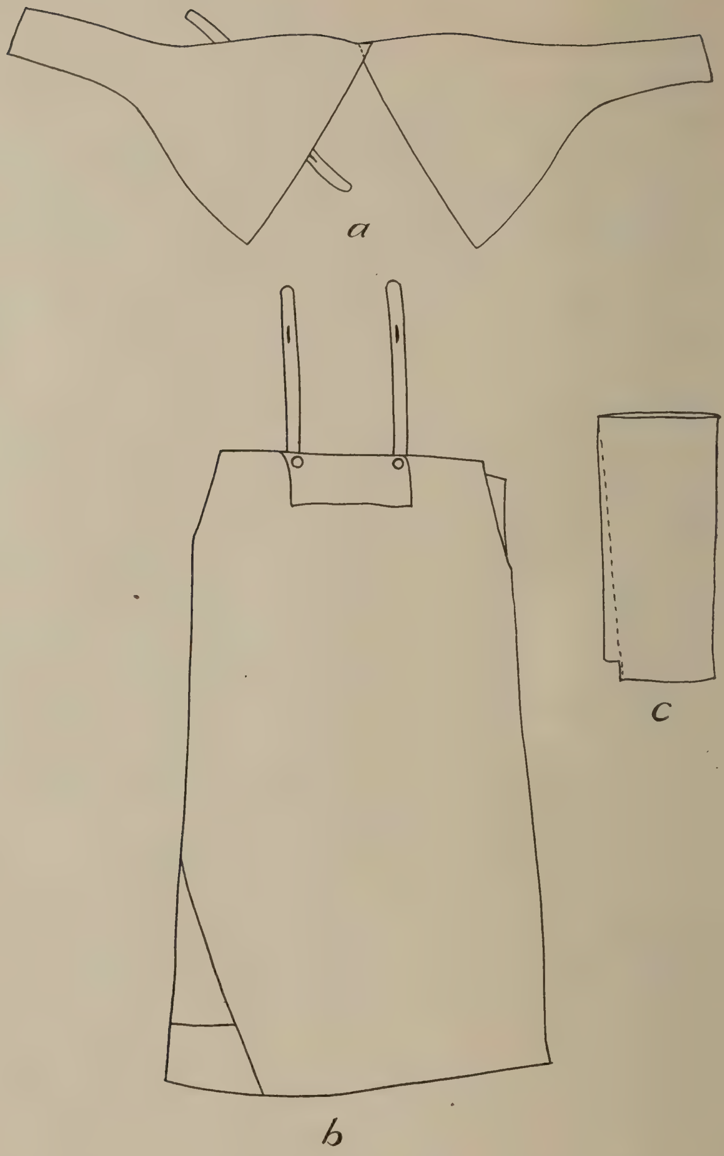

Fig. 24 (*a*, 50–8000; *b*, 50–7999, *c*, 50–8001). A Dress of Deerskin, Saulteaux, from Lake St. Joseph, Ontario. *a*, the sleeves as seen from the back; *b*, the skirt; *c*, the leggings.

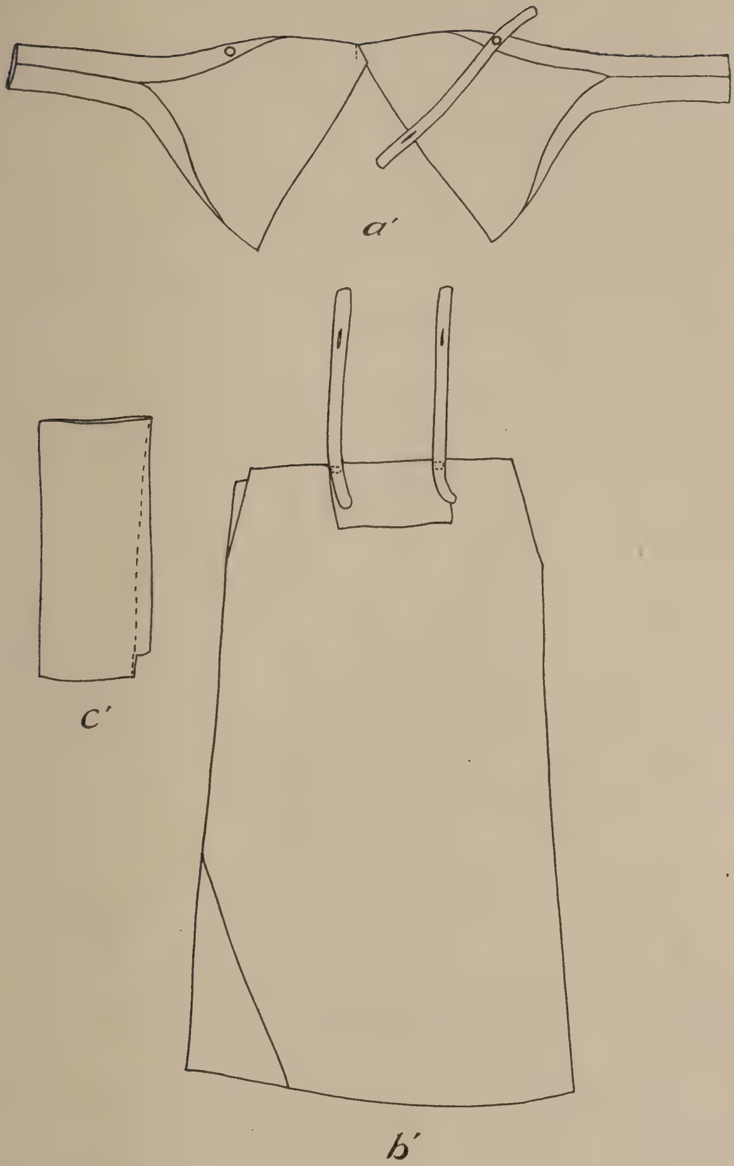

Fig. 25. Reverse of the Preceding Garment.

Mr. Willoughby has described two old specimens credited to the Plains-Cree.[1] In these specimens we find a dress made of two rectangular pieces of skin, one piece forming the skirt and the other the waist. The former

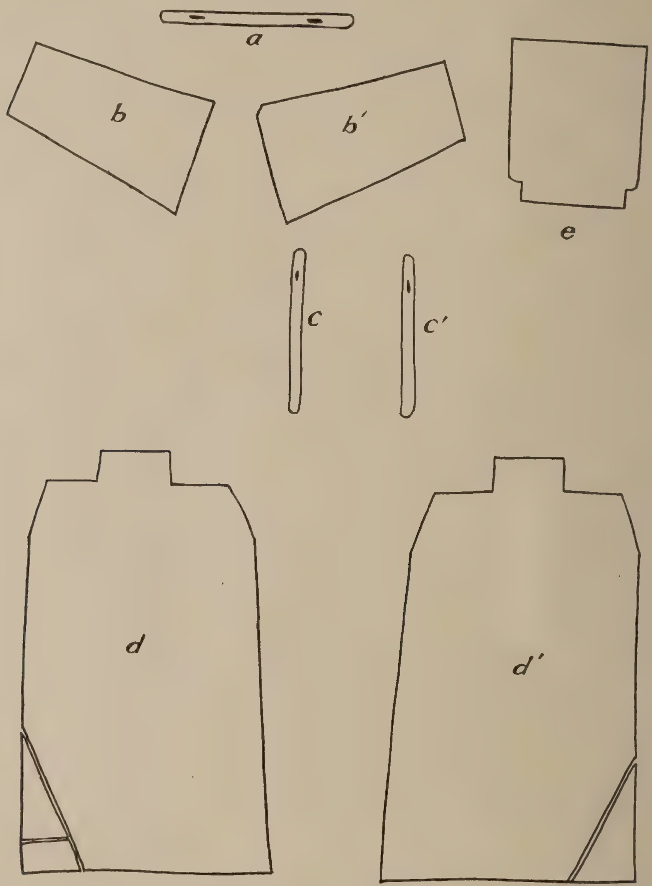

Fig. 26. Patterns for Parts of the Dress shown in Figs. 24–25. *a*, throat strap for holding sleeves in place; *b*, *b'* shape of piece forming sleeves; *c*, *c'* shoulder straps; *d*, *d'* pieces to form the skirt; *e*, piece for legging.

has the seam at the side and is thus very much like an Algonkin slit skirt. The waist is peculiar in that it is double. He says: —

The piece forming the upper portion of the garment is folded horizontally through the center, then perpendicularly in the middle. A slit is cut through the upper half of the second fold for one arm. The upper folded edges are joined over

[1] American Anthropologist, vol. 7, 1905, p. 640.

the shoulders with a short strap and thongs, but the side for the other arm is left open.[1]

Somewhat like this was the method of wearing robes among many of the Algonkins, viz., to fasten their edges over one shoulder and leave the other arm free.[2] It seems, therefore, quite probable that in this curious folded waist to the dress we have a modified form of the robe or blanket. The probability of this is increased by the data as to sleeves. Willoughby has made very clear the general use of one or two detached muff-like sleeves among the Algonkin of the east and since the preceding quotations leave no doubt as to the use of such sleeves by the Cree at the time when these dresses were worn, one may suspect that their association has a historical basis.

Thus this extension of our quest for types has taken us into the eastern region of the skirt-like garment. It appears that everywhere in the United States east of the Mississippi, except among some Siouan and Central Algonkin tribes the women wore a skirt fastened at the waist. One form of this is often spoken of as the Algonkin slit skirt, though it was used by the Iroquois and perhaps a number of southern tribes. It even found its way into the southern Plains.

Thus Dunbar gives us a very definite statement for the Pawnee:—

The dress of the women consisted of moccasins, leggins, tightly laced above the knee, and reaching to the ankles, a skirt covering from the waist to below the knee, and a loose waist or jacket suspended from the shoulders by straps. The arms were bare, except when covered by the robe or blanket. The garments of the women, other than the moccasins, were made, if the wearer could afford it, of cloth, otherwise of some kind of skin, dressed thin and soft. — Magazine of American History, IV, p. 268.

Probably the same kind of garment was used by the Cheyenne for we read in the account of Long's Expedition that: —

Their costume is very simple, that of the female consisting of a leathern petticoat, reaching the calf of the leg, destitute of a seam, and often exposing a well-formed thigh, as the casualties of wind or position influence the artless foldings of the skirt. The leg and foot are often naked, but usually invested by gaiters and mockasins. A kind of sleeveless short gown, composed of a single piece of the same material, loosely clothes the body, hanging upon the shoulders, readily thrown off, without any sense of indelicacy, when suckling their children, or under the influence of a heated atmosphere, displaying loose and pendant mammæ. A few are covered by the more costly attire of coarse red or blue cloth, ornamented with a profusion of blue and white beads: the short gown of this dress has the addition of wide sleeves

[1] American Anthropologist, vol. 7, N. S., 640

[2] *Ibid.*, 504.

descending below the elbow; its body is of a square form, with a transverse slit in the upper edge for the head to pass through; around this aperture, and on the upper side of the sleeves, is a continuous stripe, the breadth of the hand, of blue and white beads, tastefully arranged in contrast with each other, and adding considerable weight as well as ornament to this part of the dress. Around the petticoat, and in a line with the knees, is an even row of oblong conic bells, made of sheet copper, each about an inch and a half in length, suspended vertically by short leathern thongs as near to each other as possible, so that when the person is in motion, they strike upon each other, and produce a tinkling sound.[1]

Mr. A. C. Parker of the State Museum in Albany supplies the following information as to Iroquois costume: —

I have found that these early Indian women did wear a tunic or over dress made of two deerskins fastened into a sort of sleeveless gown. The necks of the pelts were trimmed off in most cases and holes were made in the side of the skin through which cords of buckskin were drawn to fasten it together. This was done by two methods, either through large holes into which the buckskin was run as a tape or run through smaller holes placed in pairs which were tied together in short strings that hung down in front. These garments were not always fringed at the side, although I am told that they were mostly so. There was a short poncho that was made by folding a single skin in the middle and cutting a hole for the neck. This garment was often so short that it did not reach the waist. It was never fastened by a belt, so that the skin of the body was often visible under the flapping garment. The Algonkin slit skirt was an Iroquois garment in the sense that the women once wore it. I am told that in early times this garment was made by simply folding the skin about the body and tying a broad band of buckskin at the waist. The skin was folded down over this band, securing it effectually. The older garments were not sewed at the side; the slit was generally over the left leg which permitted the limb to be bared and used as a sort of work board upon which buckskin strings were rolled between it and the hand. Hemp strings were also twisted in this way, that is to say, rolled into shape. In later times when broadcloth came into use, garments of that material were patterned after the old buckskin skirt, although usually the cloth garment was sewed up the side. In most cases, however, there was a short strip reaching part way to the knee on the right side, left either partly open or simply basted together.

As to the dress patterns, my inquiries have shown that the necks of skins formed the bottom of the dress and never the top. I was told that sometimes the men used the tails at the neck but that the women did not.[2] The long pieces formed by the fore legs and neck were usually drawn to the side and slashed in the fringe, but most of the neck was entirely trimmed off. The reason apparently being that the leather was too thick and so easily stiffened that it was not an ornament. One of my informants, said that the fringe formed by the fore legs was regarded as an attractive part of the ornamentation, since it hung down at the side longer than the rest and lay upon

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[1] Long's Expedition, 1823, vol. 3, p. 47.

[2] It is curious how widespread was the use of the tail as an ornament. Willoughby quotes Levett to the effect that in New England deerskin mantles were valued more if bearing a perfect tail (*Ibid.*, 504). They occur in Naskapi coats and then generally westward down through the Plains.

the skirt below. For this reason the front of the dress sometimes presented a "U" shaped outline, that is to say, the cut was so made that it was in a semicircular shape from one side to the other.

Of the women of New England we read: —

> The women's robes were longer and fuller than those of the men. Instead of one deer or bear skin two were sewed at full length. These garments were so long as to drag on the ground 'like a great ladies train.' — Willoughby, American Anthropologist, vol. 7, 505.

Before taking up the interesting points raised by these new data we may give a moment's consideration to the slit skirt. The drawings of John White, presumably of Virginia Indians in 1585 show women wearing two aprons one before and one behind, showing as they hang a slit on either side. While this is not strictly speaking a slit skirt, the sketches give one much the same appearance. The skirt is, however, a single piece of skin and most likely an entire deerskin. The conventional cloth skirts as worn by modern Indian women have one peculiarity, a trailing strip at the slit. Now, if a deerskin were taken and drawn around the body in the natural way to form such a skirt, the neck and tail pieces would come together at the side and the skin of one fore and one hind leg would hang down the side of the leg. This would give us the same effect as is obtained in the cloth skirt by the pendant strip. While this is as yet no definite proof that this is the history of the slit skirt, it must be given great probability since we find the forms of Plains garments due to similar conditions.

To return to our consideration of upper garments we find an interesting distribution for the detached sleeve. Thus, while the Iroquois women wore a poncho-like upper garment, it had no sleeves and was quite like an abbreviated Plains dress. The idea of sleeves as a separate and distinct garment thus extends over the Eastern Woodlands and into the Plains, with the possible exception of the Iroquois.

If we take the continent as a whole, we find a great sleeveless area, comprising the greater part of the Southeastern states, the Southwest, California, and the North Pacific Coast. In the north, we have the Eskimo, Déné, and Northern Algonkin areas universally using the true sleeve. Then in the intermediate territory as among the Salish, the Plains, and Eastern Woodlands, a mixed area. Among practically all of the Eastern Woodland tribes within the United States a toga-like upper garment was worn with a single sleeve for the exposed arm. This was fastened by a string so as to be readily taken off in case of need. In the Ojibway and Western Cree country the toga-like garment disappears and two sleeves are used, but still hung by a string so that the arms can be freed at will. In

pattern, these sleeves were closed only from the waist to the elbow. Now in the Plains, particularly in the north in proximity to the Cree, we find some of the sleeves for women's dresses formed by closing up the edge of the cape from elbow to wrist. We also find in the inverted yoke of the Nez Percé, etc., a piece of skin not unlike that necessary for such sleeves. In men's shirts we have also noted the same tendency toward closed sleeves and structurally the older form of sleeve (p. 52) is not unlike that used by Ojibway women. Hence, this distribution suggests that the belt of mixed sleeve types is due to opposing influences from the sleeveless and sleeved areas respectively.

This brings us to an important phase of the problem; viz., in how far can such data take us in historical interpretation? After having cited the mere facts of distribution as above can we safely say that the peculiar intermediate forms of sleeve are intrusive adjustments and as such represent diffused traits from the north?

The first thing that suggests itself is to examine the structural concepts to see how much they may have in common. If we turn to the Atlantic Coast we find a people wearing a robe for an upper garment which is fastened over the left shoulder, leaving the right arm unprotected. This impresses one as a type of costume ill-adapted to the winter climate of the latitude of New York and raises the suspicion that it was devised by a people living farther south. Further, we see an attempt to adapt it to the climate by the addition of a single sleeve for the right arm. This may well be regarded as a specific invention and not necessarily suggested by the coat-like garments of the north. In fact, one must suspect that contact with coat-wearing people would lead to the adoption of the coat *in toto,* as we find the Indian did later from the colonists. The idea of an arm covering could readily have come from a legging, or even less specific sources, simply the idea of wrapping up in something. This is, of course, speculative, but it is well to note the seeming greater probability that we have here a specific invention and not a case of incomplete borrowing. Elsewhere we have shown that the tendency in material culture seems to be the taking over of trait complexes as wholes and not in isolated fragments [1] by which the probability of this being an independent invention is heightened.

If now we take up the Ojibway sleeve we find it on a costume of a different kind. The concept here is not a skirt hung from the waist but a longer one suspended from the shoulders so as to cover the breasts. In such a garment both arms as well as the shoulders are equally exposed. In this case a coat would seem the most natural solution. We are, of course,

[1] American Anthropologist, vol. 16, 491.

dealing with the women's clothing for Ojibway men wore a sleeved shirt. Yet, the women sometimes used the eastern slit skirt with a sleeved jacket. Hence, that the Ojibway women did not exclusively use a sleeved jacket when such could not have been unknown to them, makes it clear that some other factors are involved. In the foregoing type we have again the concept of a sleeve fastened to the neck by a string, encasing the fore arm but hanging loosely over the upper arm and the shoulder. So far as we have data there are no essential differences from the sleeve of the Eastern Algonkin. The important point here is, that a pair is used instead of one. The reason for this, appearing that this body costume leaves both arms exposed. Since the Ojibway through their various divisions were at one time in touch with the main body of Algonkin tribes and have several material traits in common, it is fair to assume that the detached sleeves of both had a common origin. On purely logical grounds, one must suspect that the Ojibway were acquainted with the single sleeve costume before they took to a pair, but this may be far from the truth.

The next case in which technological descent is suggested is the cape and sleeves found in certain Plains dresses. Thus, if we took an Ojibway costume and sewed the shoulder extensions of the sleeves to the front and back of the skirt we should have essentially the same garment as found among the Nez Percé and some neighboring tribes. In fact the structural agreement is so close that a historical relationship can scarcely be denied. Thus, in the skirt as described by Harmon, Henry, Teit, et. al., the two skins from which it was made were folded down at the top and the decoration made upon the pendant flap, and in some of the Plains dresses we find a similar folding over before the material is sewed down to the neck piece. Again, the shape of the inserted neck piece or yoke is about the same as the piece one would cut for the Ojibway sleeve. It may also be noted that the decorations of Plains dresses are in every case on the part of the dress corresponding to the pendant flap of the Ojibway type. Hence, it is difficult to conceive of independent steps that would lead to these correspondences.

Though the origin of the Plains woman's skirt is somewhat obscure, it seems to be a structural concept of two entire skins joined in a definite manner, the tails at the top, the necks at the bottom. Since the skirt covers the entire person and hangs from the shoulders without sleeves, one must again suspect that a genetic relation exists between this dress and the Ojibway type although it is not so convincing as the case of the sleeves because the fundamental structural concept is merely the use of two skins. While this concept is clear in the Plains, it appears among the Salish and again among the Iroquois in less definite pattern associations. Against its accep-

tance may be offered the supposition that the adjustment is nothing but a natural process of economizing in material, and that since the form of a skin was everywhere the same such methods would result as a matter of course. On the other hand, if we look at North American costume as a whole we may see that tailoring, or cutting of materials to fit the body has but a limited distribution. It is among the Eskimo that tailoring reaches a high standard, the patterns seemingly adjusted to the lines of the body and the demands of decoration without regard to the natural contour of the material. Even among the Déné peoples the tendency is marked as shown in certain sketches by Dr. Hatt.[1] In all these garments we find a cut so devised as to fit the coat to the neck and shoulders. Of this the man's and woman's garment of the Plains is innocent, the top of the garment being straight. It is also quite noticeable that certain Salish woman's costumes have this straight cut and even Naskapi coats approach it. On the other hand, as we have noted, some Salish and Iroquois coats show tailoring and shoulder fitting.

Now it appears that the two-skin garment is not conceived upon tailoring lines but rather upon draping the figure, or hanging a covering over it. The tendency to make the most of the natural material is thus after all a part of the process and if it does occur in different localities, we find it as part of a concept complex in which the idea of tailoring is not found. We may, therefore, assume that the two-skin method indicates the presence of an unfitted body covering, usually without attached sleeves. The center of distribution for this type seems to have been the Plains.

Now let us see to what this discussion has brought us. In reviewing the data we had reason to doubt historical connections between the detached sleeves and coat garments farther north, but on the other hand, there was good ground for assuming a historical connection between the sleeves of the Ojibway type and those found upon women's dresses, among the Nez Percé and vicinity. Again, the use of two skins as a structural concept appears to be independent of the tailoring methods of the north and to center in the Plains.

We are sometimes puzzled because, while the point of view in modern ethnology professes to be historical, we often find no historical data available. Thus we may be challenged to show how one can form any safe conclusion as to the origin of these types of costume in the absence of historic data. The place of the latter is often taken by archaeological data, but in this case there are none. Yet, there are some historical data. The Blackfoot, for example, claim to have taken to the sleeveless Plains type

[1] Hatt, Gudmund, Arktiske Skinddragter i Eurasien og Amerika, København, 1914.

of woman's dress recently; the Cheyenne were observed in 1820 vacillating between two forms of costume and later going over entirely to the Plains type. Among the Salish the chronology of the types is not clear, but we infer that the Plains type was used so long ago that it does not appear in Museum collections. Since the time of Carver the Eastern Dakota seem to have shifted from the Ojibway type to that of the Plains. The Assiniboin are first credited with the Ojibway type. This rather clearly restricts the origin of the Plains type to the Nez Percé, Crow, Mandan, Hidatsa, Arapaho, Kiowa, and some of the Shoshoni and since these form a contiguous geographical group, the trait is as closely localized as we can expect.

In precisely the same manner we may treat the data for the shirt. Our collections show that the older specimens are of the characteristic type (Fig. 7*a*) and that the newer pieces tend toward coat styles. Then we have historical data restricting this shirt formerly to a triangular area comprising little more than Idaho, Montana, and Wyoming in the United States but a much more extensive area in Canada.

It may then be asked if we have not arrived at a historical conclusion by direct means and if this is not a conclusion beyond the range of a comparative distribution of specimens? The answer to this has been given above, when we reached essentially the same result by a comparative study of specimens alone. Yet, the value of historical data is very great and the moral of the case is that such data are usually to be had for the seeking. Ethnological data are based upon direct observation or testimony and so are historic. Archaeological data are quite different for they introduce relative chronology as interpreted from physical conditions.

Now that we have some of the complexities of this problem in hand, we may try to summarize the arguments. In the first place, we have established one so-called genetic fact in that whoever devised the types of dress in the Plains arrived at the particular style from the concept of a two-skin garment; and that the style was in the beginning accidental, but once established survived the abandonment of the two-skin idea. It should be noted that this is quite another matter from accounting for the origin of costume as such, for though there is a strong probability that the two-skin idea centers in the Plains, it would be absurd to assume that it grew out of an original discovery of dress in the same locality. Taking our archaeological knowledge of North America as it stands, we may be sure that the first inhabitants of the Plains had well developed costume complexes. Hence, the only reasonable hypothesis we can form is that the two-skin garment arose when someone set about making economical use of deerskins. We have noted how the poncho idea seems to precede the two-skin and how an effort was made to add sleeves to a true poncho. Our

interpretation is therefore, that if any original idea arose in the Plains it was the two-skin concept, but that if so, the inventor simply used it to create a garment that combined the ideas of a poncho and a coat. The analysis of the geographical distribution shows that along the Rocky Mountains in the region traversed by Shoshonean and Shahaptian peoples, this type of garment arose. It was not universal since many groups used extensively garments of another type made from woven materials. To the south stretching over parts of two continents was the great textile area where ponchos and sleeveless garments were the mode. To the north were the Déné and Northern Algonkin tribes fringing the Eskimo, the great area of tailored skin coats. The most probable thing is therefore that the poncho of the south was first introduced to the Shoshoni, Shahaptian, and Salish as a part of their textile development, but they were a hunting people in contact with a great area of skin coat wearers and so necessitated an adjustment. The compromises they made have been outlined in the previous discussion.

All questions of trait origins should remind us of an important problem, the actual content of a tribe's (social group unit) individuality, or the integrity of its culture. Suppose we take the woman's dress and see in how far, if at all, each of the tribes has individuality. If we take the pattern outline of dresses we note certain differences but relatively little variation within the tribe. A glance at the map (Fig. 27) will show how these are distributed. The two distinctive parts are the bottoms of the skirts and the shoulder extensions. Yet even in this respect a tribe can scarcely claim individuality for the Sarsi, Blackfoot, Assiniboin, and Nez Percé are the same. Again we find the Cheyenne, Arapaho, and Kiowa quite identical. The Dakota and Shoshoni form another group. The Hidatsa, Crow, Ute, and Apache have something in common also. The important point, however, is that these have a geographical grouping rather than a random one, thus precluding the idea of a chance agreement.

In shoulder forms there is a little more variation within the tribe and some more individuality. Thus in Fig. 28 are all the forms we found and a list of the tribes using them. The prevailing forms are shown in Fig. 27. The Dakota have two patterns but one of these is suspiciously like the man's shirt, while the other is almost identical with the Cheyenne cut. In the case of the Blackfoot, Assiniboin, and Hidatsa on one side and the Arapaho, Shoshoni, Kiowa, and Apache on the other, we have again geographical grouping.

If we take the patterns for cloth dresses, or those made of heavy strouding, we find precise uniformity throughout. The cut is plain and rectangular, Fig. 21.

It is thus clear that exact tribal individuality will be limited to very trivial and inessential features of the pattern and often lost in the range of inter-tribal variation.

The man's shirt presents greater variation, but again we find the bottom

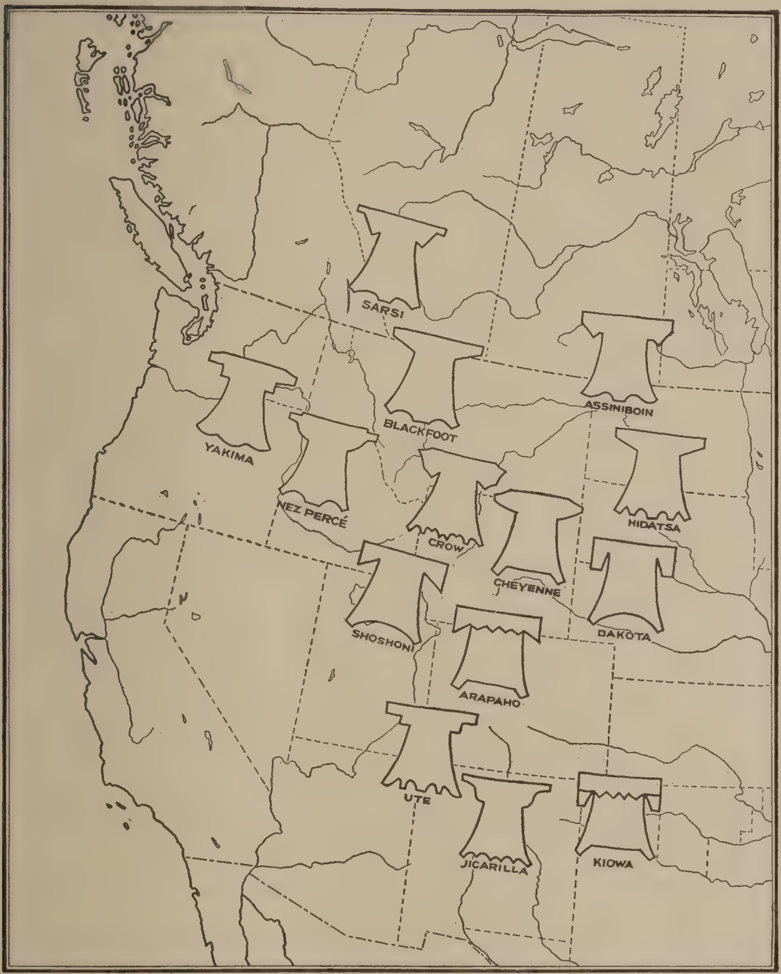

Fig. 27. Distribution of the Plains Type of Woman's Dress.

of the garment distinctive, the several types and their distribution being given in Figs. 7–9. It should be noted, however, that the specimens following patterns of Figs. 7*a* and *b* are the oldest in the collection and that the many and widely distributed coat-like patterns of Fig. 9 are dis-

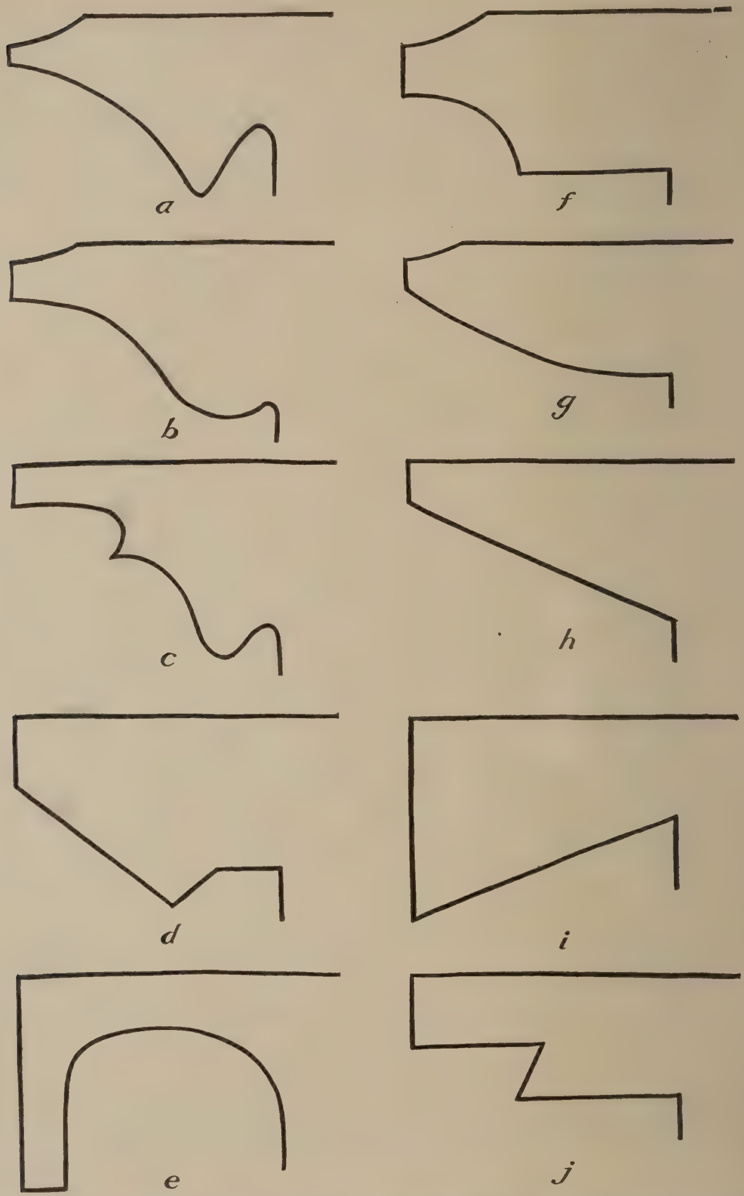

Fig. 28. Cape Patterns for Women. These are schematic and not accurately drawn from particular specimens as in Figs. 19 and 20. The observed distributions are as follows: — *a* Crow; *b* Jicarilla Apache, Nez Percé, and Yakima; *c* Taos; *d* Assiniboin and Sarsi; *e* and *f* Dakota; *g* Cheyenne; *h* Assiniboin, Blackfoot, and Hidatsa; *i* Arapaho, Apache, Kiowa and Shoshoni; *j* Ute.

tinctly recent. Yet, making due allowance for this disturbing factor there still appears a tendency toward geographical grouping in variations of the older patterns while the others seem to be almost universally distributed.

The sleeves of shirts are somewhat analogous. The older specimens follow the forms of Figs. 7*a* and *b* while the newer ones tend to the simple parallelogram cut of Fig. 9 which is found among all tribes.

Thus we find that none of these details in pattern or cut can be exclusively assigned to a single tribal group but are found more or less continuously distributed. This distribution is much more restricted than that of the fundamental pattern which we have shown to prevail in the Plains, but still indicates considerable diffusion. Should one be minute enough and possess a sufficient number of examples it would be possible to isolate further individualities but these seem to be little more than the personal equations of the individual cutters. A generalized view would be that the fundamental pattern is widely diffused and the secondary features less so. We have seen how the Plains type inter-relates to the Ojibway type, etc., which indicates that we are dealing with a true complex in which the more fundamental the idea the wider the distribution.

Investigations of this character are revealing what may prove to be an important general method in the study of culture. We have in the course of this discussion developed the specific fact that centered in the Plains we find a mixed type of costume which upon analysis presents fundamental elements prevailing in two great contiguous areas. Were this the only case of the kind it would have nothing more than a specific significance but a similar condition is found in some other traits noted in the writer's discussion of material culture.[1] In the concluding sections to Volume XI of this series, the same condition is found with respect to certain shamanistic concepts and societies; hence, it is not merely a characteristic of material culture but one of general application. We have shown in the preceding and the discussion of societies just cited, that recognizing this as a point of departure we can by analytic comparisons arrive at fairly satisfactory conclusions as to the historical and chronological relations of the traits involved. It seems therefore that when we find a trait complex showing intermediate forms and associations between the complexes of two geographically opposite areas, we may safely assume that its origin is due to the assimilation of borrowed concepts.

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[1] American Anthropologist, vol. 16.

Summary.

Some of the points of general significance developed in the preceding discussion may be formulated as follows: —

1. We have satisfactory proof that the characteristic style of garments for both men and women in the Plains area, was suggested by the natural contour of the materials used, or rather resulted from an economic use of the same. It is also shown how quickly the features determined by the shape of the original materials disappeared when trade cloth came into use, though the fundamental pattern remains the same, indicating that this pattern or general concept was one of structure rather than of adapted material. This leads one to suspect that the pattern concept came first to a skin-using people from some external source, most likely from the textile ponchos of the south.

2. The concept of tailoring, or cutting a garment to follow the lines of the shoulder and trunk is found in America only among the coat-wearing tribes: viz., the Eskimo, a few northern Algonkin, and the Déné, with minor representation among the Iroquois and interior Salish. Our data show how the idea tends to spread by increasing contact with Europeans. In the Old World tailoring appears again among the more primitive peoples of the north, but in historic peoples first among the Chinese. Its appearance in Western Europe is relatively recent. The idea of tailoring cloth seems not to have been developed by people anywhere except in Central Asia. It seems probable that the extensive use of the toga-like garment and the rectangular poncho, especially the latter, was due to the limitations of the weaving process and that here again the unavoidable rectangular contour of textiles is responsible for the fundamental similarities of styles. The Chinese on the other hand, escaped from these limitations by the development of tailoring. This presents another important problem: viz., did some of the northern tribes invent tailoring out of the necessity of the case or borrow it from some more highly cultured people in Central Asia? One may suspect that the Chinese were the borrowers, but in the absence of investigation this should be given little weight. In any case in the New World we find these two contrasting types of garment structure, tailoring prevailing in the far north and the opposite in the remainder of the continent, including the area of specialized textiles.

3. In respect to the area covered by the detailed comparisons in the preceding, it is clear that scarcely a single important feature of a given garment is peculiar to a single tribe but that two or more in geographical continuity share it equally. It also appears that the more fundamental a

given feature, the wider its distribution. In other words, a tribe's individuality is merged into the mere personal variations of individual workers, and so far as these specific traits go, the limits of the social group have no significance. Perhaps after all it is only in traits of culture where several individuals must actively cooperate, as in ritualistic performance, that the social unit is of consequence; or, unless the social unit as such functions in a trait in contrast to individuals, may we expect the bounds of the social unit to correspond with the bounds of the trait in question.

4. The preceding data may also serve as an approach to a question of validity in evidence. Thus, we may ask in how far mere comparative studies in the forms and distributions of traits can give light upon the historical associations of traits? The suggestion in this case is that if the search is pushed far enough, the necessary data for a satisfactory conclusion may be found. For perishable objects, such as costume, real historic data is usually obtainable; for the more durable, as stone, ceramics, etc., archaeological methods give a definite relative chronology. Another important problem is as to the determination of genetic relationships in technological processes by a logical analysis of the concepts involved. Within the limits of this study this is little more than a restatement of the above historical problem since the specific point is as to which of these types of dress, or parts of dress, as sleeves, yoke, etc., suggested or developed into the other; but when extended to the clothing of the continent or the world, tends more and more to be purely a problem of genetic relationship. The scope of the preceding investigation is too limited to give a concrete example of this problem, and while it suggests the great difficulty of arriving at the truth without the aid of supplementary historical data, it does suggest that the future may see developed a few principles of culture diffusion which taken with the analysis of technological concepts will lead to safe conclusion as to their genesis.

5. Finally we have found in this material trait a good case of culture diffusion. That the secondary features such as cut of skirt-bottoms, sleeves, etc., when found to be the same for two or more tribes are so because of tribal independence in invention, is scarcely admissible because of the observed geographical continuity. A random repetition of specific inventions should also have a random distribution to be consistent with the laws of accident. Likewise the fundamental structural concept which underlies these secondary concepts while very widely distributed is also continuous, whence it follows that the diffusion hypothesis is the most acceptable. We do find one disconnected locality for the two-skin concept among the Iroquois; but since these people were great travelers and had other costume concepts in general use, we may hesitate to credit them with its independent invention.

ANTHROPOLOGICAL PAPERS

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VOL. XVII, PART III

STRUCTURAL BASIS TO THE DECORATION OF COSTUMES AMONG THE PLAINS INDIANS.

BY

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STRUCTURAL BASIS TO THE DECORATION OF COSTUMES AMONG THE PLAINS INDIANS.

By Clark Wissler.

Preface.

The following is a continuation of the preceding study of structural concepts in the costumes of the Plains Indians, attention here being directed to styles of ornamentation. The examples noted were first presented in the January Anthropological Lectures at this Museum in 1915. The illustrations and citations are for the most part to preceding papers in this series. Students of primitive art have often believed it possible to discover the successive steps in the evolution of designs. By arranging examples found upon prehistoric or later objects in order of their increasing conventionality, series have resulted, showing a clearly realistic drawing at one end and an almost entirely geometrical one at the other. Such series suggest that all these forms were initiated by first drawing from real life and then by successive conventionalizations arriving at a pure geometric form. The weak point in this interpretation is that there are no means of dating the units of the series, their arrangement being merely a matter of selection on the part of the observer. There are still other obvious objections to the interpretation, so that the tendency of the critical is to reject the conclusions. Somewhat analogous attempts have been made in the study of industrial arts and technology, but with equally unconvincing results. Consequently, as the case stands today, we can point to scarcely a single example in which the life history of a trait can be satisfactorily demonstrated in objective data.

In the following we have some less elaborate series of another kind but still good examples of the genesis of specific decorative designs. With one possible exception, they differ from the previous genetic studies of design in that the origin was not strictly in attempts at realistic art but merely grew out of attempts to embellish surfaces of fixed contour and to conceal unsightly lines. The exception referred to is the deer tail design upon certain Teton specimens, where we have a good case of a design arrived at, in part, by conventionalized representation.

March, 1916.

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Introduction.

In the preceding paper we have analyzed the structure of certain garments found among the Plains tribes. One of the most unique points developed was the stylistic influence of the natural contours in the materials. If we push our view beyond the boundaries of the Plains, we find evidences of a like relation even in textiles, from which it appears that we have here a principle of style development. In the course of this investigation we noted somewhat analogous relations between structure and ornamentation, the subject of this discussion.

Women's Costume.

The Yakima dress (p. 66) seems to be a good example of the fundamental structure in Plains dresses. The shoulder line is here produced by the simple expedient of folding over the tail end of an elkskin. The contour of this piece is, no doubt, trimmed to a symmetrical form but still follows the lines of the original pelt. This folded over portion thus defines a peculiar curve whose origin is in the original material and not in the aesthetic constructive activities of the maker. It is, of course, true that the latter is chiefly responsible for its balance and symmetry, but the general direction of the curve was an external affair.

The chief decorations upon these dresses are the beaded yokes. In the Yakima dress we note a band along the shoulder seam where the folds of the front and back halves of the garment are sewed together, but the most prominent feature is the very broad band of beads following the curve of the turned over section. When dressing a skin for a dress the hair is left upon the tail and this tuft of hair becomes the conspicuous center piece of our broad beaded band.

Turning to the Crow dress on p. 64, we note a slightly different structure, for instead of a fold, a yoke is cut of two pieces and laid over the large skins forming the two halves of the dress. But the tail tuft and the same curve as before, mark the contour of this yoke which overlaps the garment precisely like the fold in the Yakima type. The beading of this Crow piece is far less elaborate than for the preceding but again follows the same con-

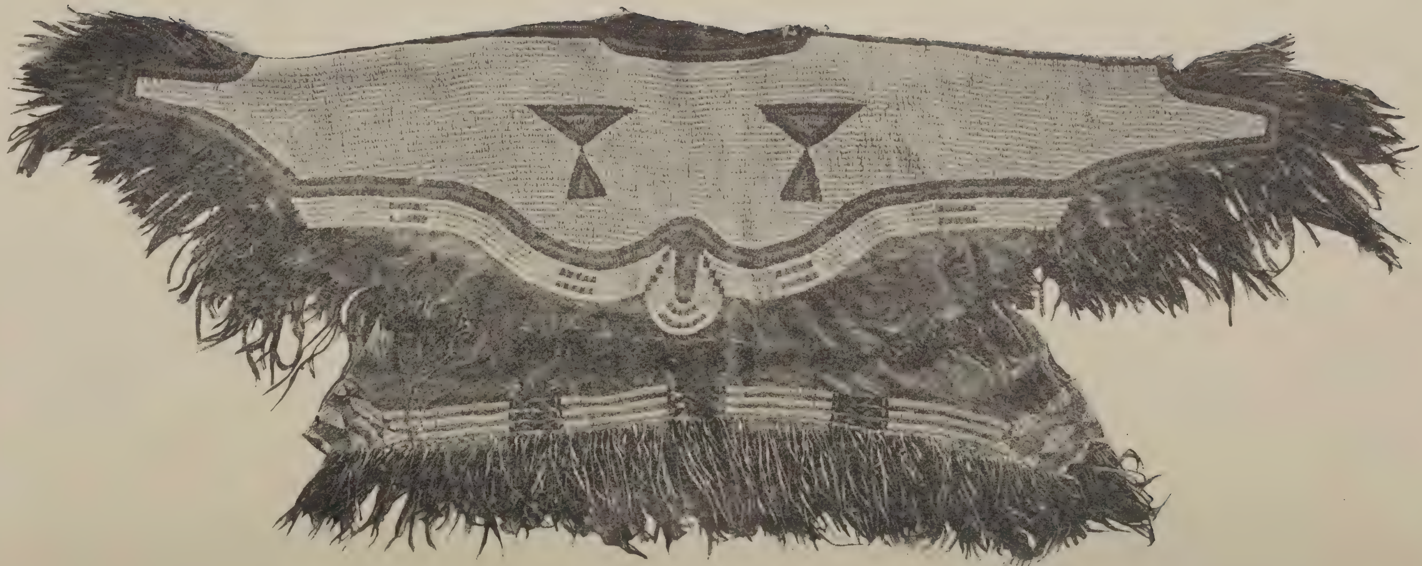

Fig 1 (50-2021). Decoration upon a Woman's Costume. Dakota. For variants of this design see Bulletin of this Museum, vol. 18.

tour lines. However, on the Blackfoot dress shown in vol. 5, p. 126, we have broad bands as in the Yakima case and a separate yoke like that of the Crow.

So far as our observation goes, the tail tuft is a leading feature in the group of tribes of which the Blackfoot and Crow form the center. Further south we find the whole upper part of the dress beaded. Our most interesting examples are the older specimens from the Dakota of which Fig. 1 is typical. In structure, we have a large yoke to which the skirt is attached by a straight seam. Yet, the beading is so laid out as to give us the contour notes in the preceding and then below this and parallel to it is a broad band. There is no tail tuft but a beaded design of the same form around which the band passes with a sharp curve. As there are a number of dresses in our Dakota collection bearing similar designs, this case is typical. The historical relation between this decoration and those we have just discussed is obvious.

In the southern Plains we have a somewhat different dress style (p. 87). The Kiowa, Arapaho, and to some extent, the Apache, make a large rectangular yoke to which the dress is attached, but usually underneath so that we have the appearance of the folded over yoke. On a few of these yokes we find the tail tuft, which carries us directly to the fundamental structural type. The beaded decorations, however, do not follow the characteristic curve of the north, but the rectangular outline of this yoke. That the curve idea was once entertained is suggested by two old specimens in the Museum bearing the tail tuft and also approximating the curved contours we have noted.[1]

If now we turn to the northern frontier of the Plains and to the Woodlands we find a similar relation between decorations and patterns. The type for the Cree described by early writers and represented by Fig. 23, p. 74, bore decorations on the folded over yoke. Quill designs were often placed here (p. 71). In the modern Ojibway type (p. 73) we have the fold but the decoration is applied to the shoulder straps and to an intervening section of the yoke.

As we have shown in the preceding paper, the one connecting link between these dresses and those of the Plains is this folded over yoke. The use of sleeves in the east and a different method of fitting the skins did not, however, give the peculiar curve we have noted in the northern Plains. On the other hand, the dress of the southern Plains has certain analogies to the

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[1] One of these specimens is credited to Taos and the other to the Apache and both are of primitive structure, like Fig. 18, p. 66. The tail end of the skin is folded over and hangs down. The decoration is chiefly a row of pendants.

Woodland type, whether due to convergence or diffusion we are unable to decide.[1]

Along with the concept of a folded over yoke goes the idea that it was the place for the most elaborate decoration. As we have previously stated, the fact that we have a continuous distribution for this association between structure and decoration, justifies the assumption of a single origin. The point here, however, is that when the structure of the yoke is modified, its style of decoration tends to change, but is not exactly correlated because in some instances the style has survived in spite of these changes.

The most interesting survival is found on Dakota dresses where, as we have stated, the tail has given way to a U-shaped conventional design. In a previous study the symbolic association with this design has been discussed.[2] Curiously enough, the design is not called a deer tail but is said to represent a turtle emerging from a lake. In the above citations, it is shown how this conforms to a mystical conception of an association between turtles and women.

If now we recall the basic facts in aboriginal decorative art, we see here a very important concrete case in which the symbolic interpretation can make no good claim to being the creative motive of the design. On the other hand, there is the very best of evidence that the design arose from the structure and the use of the homely deer tail as an ornament. The symbolic association is, therefore, secondary.

Men's Shirts.

The decorations upon shirts of the Plains men present a more perplexing problem. Reference to the illustrations in the preceding paper indicates one common conventional style. This consists in the main of a broad band over the shoulder and sleeve seam and two transverse bands like suspenders or shoulder straps. These bands are beaded or quilled strips of skin, sewed in place upon the shirt and are scarcely distinguishable from legging bands. To one edge of the bands a fringe of hair or ermine tails is attached. The oldest shirt we have seen is that shown on p. 50. The band on the top of the

[1] It will be noted that the yoke of the Arapaho and Kiowa is cut of a single piece. The shapes of some of these suggest that a small skin was placed transversely and a hole cut for the neck. This would give us the characteristic contour. The fold effect is secured by fastening the skirt up under the edge of the yoke. It should be considered that it is only an elkskin that is large enough for a woman's dress and that if antelope or other deer are used, piecing must be resorted to.

[2] Bulletin, American Museum of Natural History, vol. 18, p. 240; also Museum Journal, 1912.

sleeve and shoulder is upon the other side, as drawn. (See Bulletin of this Museum, vol. 18, fig. 95.) When we examine the specimen it appears that the bands cover seams. The top seam is covered by the long band and the transverse seam by the shoulder strap. However, this old shirt differs from others in that the shoulder bands are short. Further, the long shoulder bands on later shirts do not cover the seams but slant inward. This slant and greater length of the bands on newer shirts at once raise a suspicion that they may have been copied from military uniforms. While we have found no specific evidence to support such a view, its great probability must be recognized. On the other hand, the placing of these bands over the seams of the older shirts takes us back to a principle of decoration used on other parts of aboriginal costume and therefore is strong argument for the aboriginal origin of the bands, though it may well be that military models modified them later. We find upon a number of shirts a secondary fringed band covering the seam where the sleeve is attached and again in cases where the slanting long bands are absent we often find the short fringed band over this seam. This would be consistent with the military origin of the slanting band.

According to tradition, the hair fringe had a definite function among the Dakota but it is not certain that the decoration originated among them. However, the concealing of seams by fringes of skin and other materials was common, as will be noted on other men's garments illustrated in the preceding paper. In distribution this method of concealing seams by fringes seems to have been the prevailing mode in northern United States as far west as the Coast Salish and gave us the characteristic coat of the white trapper. The fact that both the bands and the fringes follow the seams leads us to the conclusion that their position and place was determined by the structure of the garment.

There is still another curious decorative feature to these shirts. The most of them have at the throat and back of the neck a triangular pendant, usually highly decorated. This cannot be accounted for on structural grounds for it has no necessary part in forming the garment nor does it conceal any defect. It cannot be the tail for this is at the bottom of the shirt. In Carver's book (p. 230) we have an illustration of a Dakota (?) wearing no upper garment, but at his throat is hung a triangular object which in form and design suggests the pendant upon these shirts. From the text we see that this is a knife sheath.

> The dagger placed near it in the same plate, is peculiar to the Naudowessie nation, and of ancient construction, but they can give no account how long it has been in use among them. It was originally made of flint or bone, but since they have had communication with the European traders, they have formed it of steel. The length of

it is about ten inches, and that part close to the handle nearly three inches broad. Its edges are keen, and it gradually tapers towards a point. They wear it in a sheath made of deer's leather, neatly ornamented with porcupines quills; and it is usually hung by a string, decorated in the same manner, which reaches as low only as the breast. This curious weapon is worn by a few of the principal chiefs alone, and considered both as a useful instrument, and an ornamental badge of superiority.[1]

Now while this does not prove that the triangular ornament upon Plains shirts was derived from the conventional knife sheath badge of office, it does nevertheless offer one rational explanation. In the discussion of distribu-

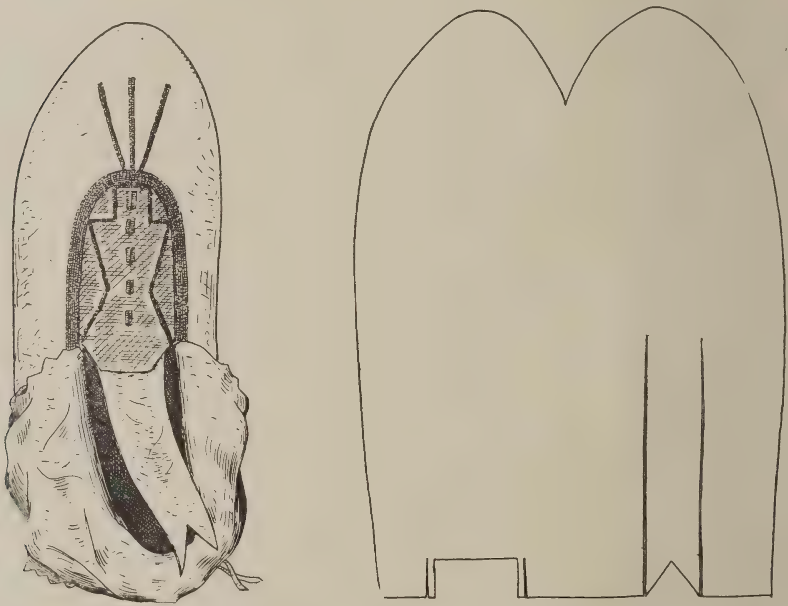

Fig. 2 (50–4516b). Blackfoot Moccasin Decoration and Pattern. The sole and upper are in one piece.

tion of these shirts (vol. 5, p. 135) we have shown reasons for assuming the type to have been dispersed from the Dakota. Also, it is here that we find this shirt to have been the badge of high office in the tribe (vol. 11, p. 7). Hence, what is said about the conventional knife sheath is consistent with this. Further speculation on this point is unnecessary, but some field inquiry might be worth while. Not all these pendants are triangular, some being rectangular, but the triangular one is the most frequent and most widely distributed.

[1] Carver, John, *Travels through the Interior Parts of North America*, London, 1778, 296.

Moccasin Decorations.

In order to give our studies of ornamentation a broader foundation we extended them to moccasin decorations. One of the first interesting cases is the U-shaped design on Blackfoot moccasins (Fig. 2). The structures of these moccasins have been discussed in vol. 5, p. 140,[1] but we see from the figure that the sole and upper are in one piece. The design is not placed directly upon the upper, but upon a red cloth which is then sewed down upon the leather. Such designs are very frequent on Blackfoot moccasins and are by tradition the older style. Fig. 3 reproduced from vol. 5 shows a similar design upon a hard-soled moccasin. Another variant of the design is shown in Fig. 4. In both cases the design is beaded upon red cloth as before and then sewed down upon the leather.

Now the question arises as to what suggested this peculiar overlay ornamentation which has no visible function in the structure. Of the immediate neighbors of the Blackfoot only the Sarsi, Assiniboin, and Northern Shoshoni have so far been observed to make occasional use of this style, but farther east and north we find it of frequent occurrence. Examples have been illustrated by Mr. Skinner in vol. 9, pp. 20 and 123, Figs. 6 and 41, and also in vol. 5, p. 144, Fig. 91 (reproduced here as Fig. 5). From the descriptions in these references, we see that here in contrast to the Blackfoot we have a structural relation between the U-shaped design and the moccasin pattern. The pattern required an insert of this shape to which the gathered edge of the upper gives a bold contour. On many of the moccasins from the Cree and Montagnais, around Hudson's Bay, this insert is covered with cloth, usually red or dark blue. On others, the insert is of leather but it bears the decorations, while the remainder of the upper is plain. This general pattern with a U-shaped insert is very common among the Cree, Saulteaux, Montagnais, Naskapi, Déné, Thompson, Shuswap, and a few random specimens have been noted among the Crow and Shoshoni.

Now, returning to the Blackfoot we see that they differ from all these tribes only in that the decoration is upon a different moccasin pattern. The pattern they use does not require an insert, so in order to follow the same style they make a false one. Here we can have no doubt as to who are the imitators.

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[1] A far more exhaustive study of the subject has been made by Dr. Gudmund Hatt in, *Mokkasiner geografisk Tidsskrift,* 22 B. H. V. Copenhagen, 1914; 172–182; *Arktiske Skinddragter*, Copenhagen, 1914, 168–172, and who is about to publish an even more detailed discussion in English.

Another interesting problem is as to whether the Blackfoot have changed the structure of their moccasins or simply borrowed a style of decoration. The distribution may throw some light upon this point. So far, the structural pattern of the Blackfoot moccasin (Fig. 2) is found among the Western Cree, Thompson, Nez Percé, Sarsi, Assiniboin, Gros Ventre, and Northern

Fig. 3 (50–4566). Blackfoot Moccasin with Hard Sole, but Decorated as in Fig. 2. The upper is a separate piece of skin.

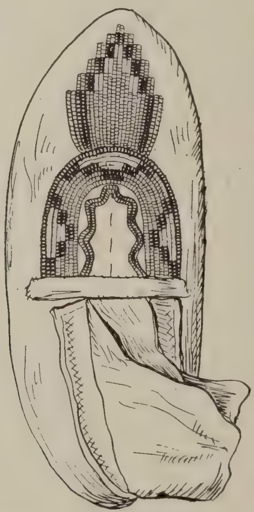

Fig. 4 (50–4406). Blackfoot Moccasin of Hard-soled Pattern with Decoration similar to Fig. 2.

Shoshoni. It is therefore a localized type in contradistinction to the insert pattern of the east. But curiously enough, only the Blackfoot and the small tribes under their influence have this decoration well developed. The chances then favor their having borrowed the pattern and substituted it for one of the eastern type, but retaining the old style of decoration. They also took over the hard sole type of moccasin typical of the Plains and in many cases placed the decoration upon it as well (Fig. 3). There is in fact a close similarity between the structures of Blackfoot one-piece moccasins we have just described and those of the hard sole type, for when we compare them with the eastern insert type, we see that the former have the common concept of an upper and a sole. One may suspect therefore that

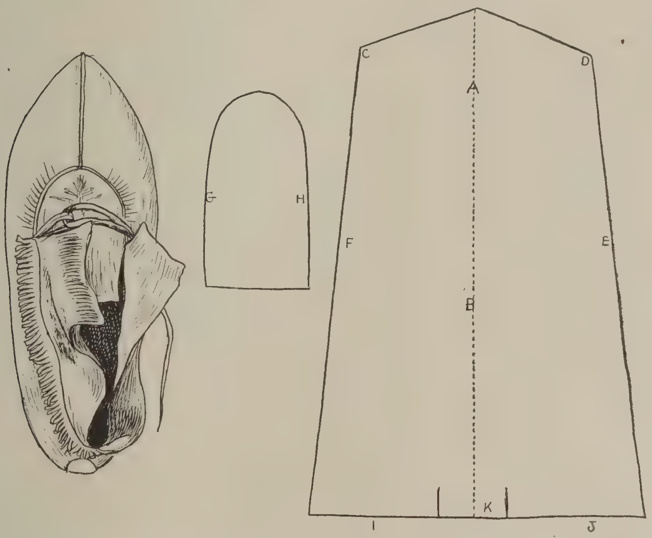

Fig. 5 (1–4614). Type Pattern for Moccasin with U-shaped Insert. For details of structure see vol. 5, p. 144.

this one-piece pattern was developed by a people familiar with hard sole moccasins. Thus we have here another instance of an intermediate structural type occupying an area between two other areas of contrasting types (p. 89).

We may turn to another style of moccasin decoration in the Plains, a simple band over the top. It takes two general forms as in Fig. 6. In our collections form *a* (the first five) occurs among the Blackfoot, Sarsi, Gros Ventre, Arapaho, Assiniboin, and *b* (the sixth and seventh) among the Cheyenne, Crow, Dakota, and Arapaho. In every case it is found on moccasins of the two-piece pattern and occupies the middle of an un-

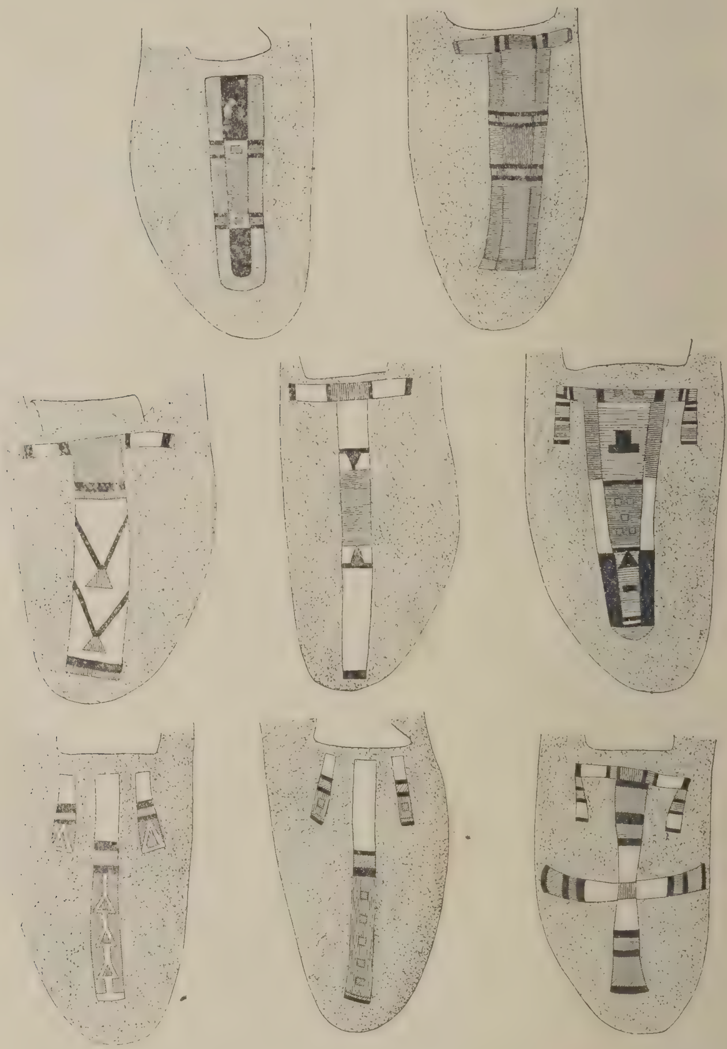

Fig. 6 (1–5709, 50–583, 50–1021, 50–585, 50–410, 1–5707, 50–582, 50–584). Arapaho Moccasins bearing the Banded-Upper Type of Decorations. From Bulletin vol. 18, plate I.

broken surface. There is, therefore, no structural relation such as we found in some eastern moccasins. Yet, when we look outside of the Plains area we find a similar band used to conceal an unsightly puckered seam. This is particularly true of Iroquois moccasins but also occurs on those of the Kickapoo, Sauk, Fox, Penobscot, and Delaware. A type specimen

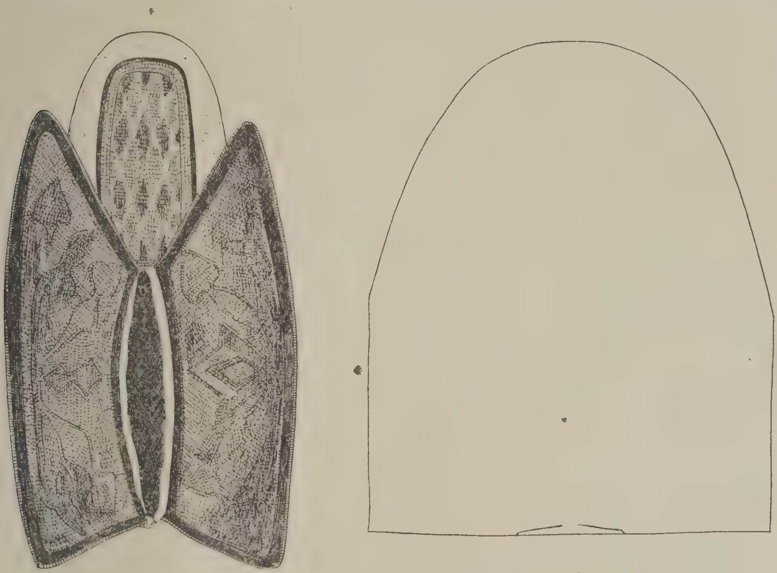

Fig. 7 (50–2263). A Sauk Moccasin with Overlay Decoration. A single piece of skin folded over the foot so as to form a seam on the instep.

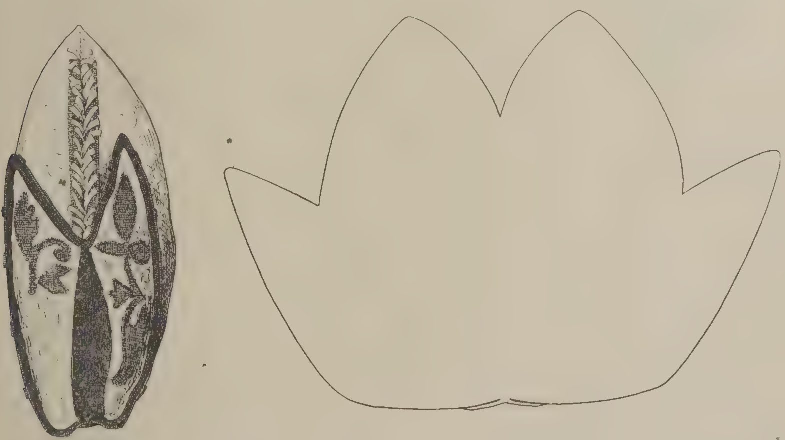

Fig. 8 (50–7557). Winnebago Moccasin with Top Fringe and Beaded Band Decoration.

is shown in Fig. 7. Usually the beaded or quilled designs are upon a strip of leather which is sewed down upon the moccasin.

Thus we have another case quite analogous to the preceding but one in which the evidence for a historical relation is far less convincing. Nevertheless, the selection of this style by the Iroquois, for example, is clearly an adjustment to the pattern and offers one more example of the structural control of costume decoration. The use of the same style in the Plains in disassociation from the pattern may prove to be a case of convergent evolution but the probability of its structural origin cannot be denied.

A special variation of this pattern is noted in the Winnebago specimen, Fig. 8. Here a fringe is placed on the seam between two narrow beaded bands. Among the Teton-Dakota we find the decoration produced upon a two-piece moccasin by sewing down the fringe into the beadwork (Fig. 9).

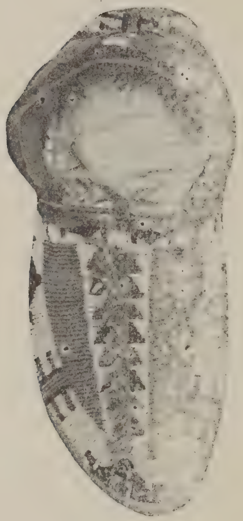

Fig. 9 (50–5221). A Hard-soled Moccasin with Median Fringe upon the Upper. Dakota. In this case the fringe is sewed down upon an even surface. Pattern same as Fig. 3.

One more problem in moccasin decoration may be cited. Among the Apache we find a curious pattern for the upper of a hard sole moccasin, Fig. 10. A slit is cut almost the full length of the upper and a long V-shaped piece inserted. Just why this is done is not clear but the result is two long seams terminating in a point. It is barely possible that the originators of this moccasin were familiar with the pattern in Fig. 5 and carried over the idea of an upper insert when adopting the hard sole two-piece pattern, but there is as yet no very good evidence in support of this.

Many moccasins of this pattern are undecorated save for a fringe on one side of the insert. The insert itself is often painted red, blue or yellow. When beads are added we find a border down each of the seams usually joining the border skirting the sole. This gives us a characteristic style of decoration in which two converging lines extend down the top of the upper (Fig. 11).

The Apache pattern is found among the Comanche and occasionally among the Kiowa but the style of decoration has been observed among the Cheyenne, Arapaho, Crow, Dakota, Assiniboin, Blackfoot, and Gros Ventre. In most cases the converging bands are placed upon the upper of a simple two-piece pattern as in Fig. 11b, but occasionally a fringe is added and the

enclosed V-shaped space painted. Since we find a continuous distribution of this style and all degrees of association between it and the essential structural features, the most acceptable explanation of the case is that the style of decoration developed on moccasins of the Apache pattern. Of course, this does not imply that the Apache were the originators.

We have now examined three styles of moccasin decoration in the Plains area and in each case found good reasons for assuming their development as due to the structural type of the original moccasin. While in the second case cited it may be that the style was independently developed in the Plains

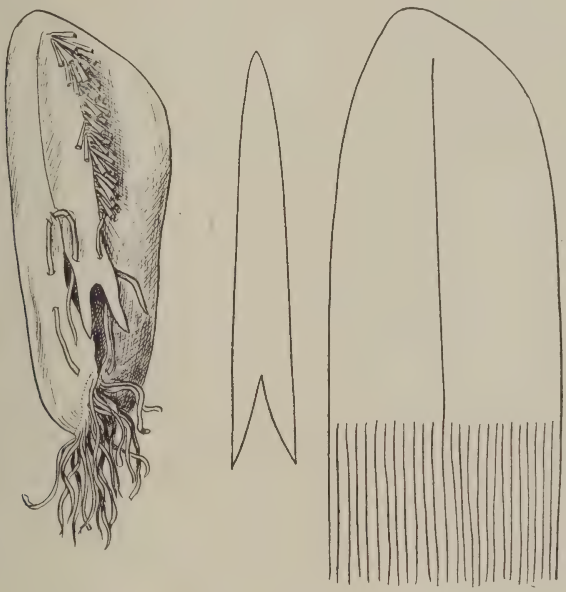

Fig. 10 (1–5423). An Apache Moccasin. The long tongue-like insert is usually painted and frequently bordered by beaded bands.

area, it is clear that in the east its use grew out of the structural concept. Since we have also found this principle to operate in body clothing in the same areas, a very important problem is presented. We must in the future give more consideration to the principle of survivals in style to the extent of transferring particular styles to new structural patterns. It does not follow though, that wherever we find the style upon a foreign pattern, the pattern has been changed. Thus, in case of the third type of moccasin decoration we have discussed, there is no reason to doubt but that the style was diffused

more widely than the structural pattern. This part of our investigation suggests that the further development of these problems in the Plains area may forge a new link in the chain of evidence for former historical connections.

In connection with dress decorations we found an interesting point in the symbolic associations of certain designs. A similar relation appears in certain moccasin decorations. A moccasin was collected from the

Fig. 11 (50–658a, 50.1–6339a). A Decorated Apache Moccasin and a Simple Two-piece Moccasin from the Arapaho, bearing the same style of decoration.

Dakota in the third style as described above (Fig. 12). In this case the beaded bands were in white and were said to represent the warpath in winter. Considering all that has gone before it is impossible to conclude that the placing of the bands in this way was first hit upon by an individual who wished to represent a warpath covered with snow.

The U-shaped design among the Blackfoot seems to have no definite symbolic associates but the maker of Fig. 3 said that the three radiating lines and the curved border represented the aurora and the human figure, the "white men of the north dancing." (The Blackfoot belief is that some white-colored men reside in the far north and that the aurora is their dance fire.) This appeared to be an individual interpretation but still is an example of the secondary use of a style of decoration in the expression of a mythical idea. In this case we can see just how much the maker may have originated, but since the same figures were made by others (Fig. 4) we must doubt that even here the maker did anything more than read into the conventional pattern.

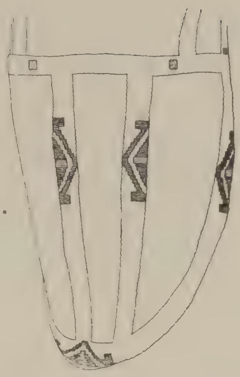

Fig. 12 (50–2993b). Symbolic Decoration upon Teton Moccasin of the Apache Style. The pattern is that of Fig. 3.

Concluding Remarks.

The preceding discussion does not consider the detailed design but only the decorated units of surface. For data upon this point we checked over the large series of moccasins in our collections. While the small figures used in the bands and fields of decoration are very widely diffused over the area, we failed to find that the style of decoration influenced the choice of them. Elaborate designs are unsuitable because of their large size but beyond this there seem to have been no limitations to their use. The two-piece moccasin of the Plains with its broad unbroken expanse of upper encouraged more elaborate designs than the patterns of the east. In the latter region the ankle flaps and sometimes an enlarged tongue were taken as the decorative surfaces, thus giving an entirely different objective aspect. But aside from the mere difference in the size of the decorative fields and the influence of the local modes of artistic expression, we have found no correlation between these styles and the design detail.

The method we have followed in these investigations differs from that formerly employed in that we have not based our conclusions upon objective resemblances but upon the correlations of such resemblances and facts of culture distribution. Thus the reader may object to our interpretation of the resemblances by which we group moccasin styles in Fig. 11 on the ground that we have simply selected from a large number of moccasins those that happened to resemble the chosen type. In this case the underlying assump-

tion would probably be that the whole was merely an accident of variation in moccasin decoration. The correlations we have cited have an important bearing here. The style of decoration carries three rather distinct units between which there appears no necessary association; the converging narrow lines, the painted space, and the fringe. The tendency of these to appear together in the Plains complicates the accidental interpretation. Then the distribution shows this style to prevail among these tribes using the corresponding structural pattern of moccasins, while its appearance elsewhere upon the two-piece moccasin is but occasional. Finally, the distribution of these random examples is geographically continuous with the tribes using the corresponding structural patterns and relatively restricted. It is such correlations as these that we have appealed to for guidance in our interpretations.

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BASKETRY OF THE PAPAGO AND PIMA

BY

MARY LOIS KISSELL

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BASKETRY OF THE PAPAGO AND PIMA.

By Mary Lois Kissell.

Preface.

The investigation herein reported was made during the winter months of 1910–1911 in some two dozen Pima and Papago villages, as a part of the Museum's systematic study of the peoples of lower culture in southwestern United States. All the principal villages of the Santa Rosa Valley and foothills were visited, together with those of the Santa Cruz near Tucson, including San Xavier, Kioto, Little Tucson, Indian Oasis, Big Fields, Cababi, Comababi, Vinumuku, Conquien, Quijotoa, Kuvuhea (Chewak), Twavaheu, Brownell Camp, and Noepa; as well as the Pima villages of Kuu Ki, Hassanykuk, Saopuk, Talsituk, Oskuk, Wetcurt, Rsotuk, Hermho or Amn Akimult, and Babychurl. Acknowledgment must be made for the identification of the plants employed in basketry to the staff of the botanical department of the University of Arizona; and for very courteous hospitality to Rev. and Mrs. Herndon, Indian Oasis; Mr. Day, Quijotoa; Mr. Brownell, Brownell Camp; and Mr. R. Rasmessen, Tuscon. For the drawings the author is indebted to Miss Ruth B. Howe and for the photographs of specimens to the Photographic Department of the Museum, for that of the Papago granary to the United States National Museum, and the basket maker within her storage bin to Putnam and Valentine, Los Angeles. The outdoor photographs were taken by the author, often under very adverse conditions, but the subjects presented are in the main new. The expenses of the field trip were contributed by Mr. Archer M. Huntington.

April, 1916.

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Introduction.

This paper presents material obtained during three months of research in southern Arizona among the Pima-speaking tribes — the Papago and Pima proper — and records some of the results of an intensive study of their textile arts. Dr. Russell's comprehensive treatise on "The Pima Indians," and Dr. Lumholtz's "New Trails in Mexico" give a general survey of the ethnology of these two tribes. It is the purpose of the present paper to deal solely with their basketry, since there are important points related to this art heretofore undiscussed; and to include descriptive matter pertaining to technical details of present-day processes, with reports of former methods now abandoned, but still within the memory of the tribes; beside explanatory matter concerned with conclusions drawn from this information and from observation. Technic of itself has only economic value, its scientific significance lies in its bearing upon some theory, or problem, that is in the disclosing of some hidden truth.

The aim of the expedition was not only to obtain exact details as to the processes and the materials employed in this art, but also to procure the more interesting and important data concerning beliefs, sayings, and magic connected with the art or its processes. In other words, to find all the lore pertaining to the textile arts especially that of the basketry, should there be any, and still be known to the present-day Indian. This together with information concerning symbolism in design, constituted the two points of greatest importance.

As is frequently the case in field investigation, the data most earnestly desired may prove elusive and not materialize, while in its place other data are secured bearing on totally different lines. So it proved in this instance, that while full details as to the processes, tools and materials, together with interesting related facts, were easily obtained, the two topics believed to be of greatest moment yielded scanty results. This may be attributed to one of two causes: either to the absence of basketry lore because it had been forgotten, or had never existed; or to the very brief acquaintance with individual Indians, which was all the short trip afforded, as the three and a half months allotted to more than twenty scattered villages were insufficient for other than casual friendships. Longer acquaintance might have established an intimacy with individuals, such as would invite confidences and disclosures of sacred lore. It is hoped that later investigations, especially among the very old women, will unearth such data if they exist.

As has been said, religious meaning attached to basket materials, their

gathering, preparation, or employment in construction seems entirely wanting. The art appears to be purely a practical one, prompted by practical motives only. This is not absolutely so, however, in connection with the use of three of their baskets — the small food basket of the medicineman, the basket drum, and the rectangular trunk shape for holding ceremonial medicines and paints. This last is made only by the Papago, and employed exclusively for this purpose, while its size is carefully fitted to hold some specific medicine. The basket appears to have no ceremonial significance in itself, its function seems to be purely utilitarian, that of holding the ceremonial articles when not in use. The food basket in question is a deep tray of small circumference, so closely constructed as to hold water, and is used by the medicineman to hold food and drink while he is performing the ceremonies for healing the sick, for bringing rain, and when on his pilgrimages for the sacred salt. It is made for this purpose and used at no other time, but whether its function was more than utilitarian, knowledge was not obtained. The basket drum is also a tray shape, but it is not constructed for this particular use, nor is it reserved for this exclusive service. Any basketry tray at hand will do, if it is hard and firm enough in build to emit a loud sound when inverted and struck with the hand or a stick, since the beating upon it accompanies the chants of the medicineman at ceremonial dances, or when making his cures. The basket tray of these peoples is a food tray, and whether for this reason there is in it some magic which imparts efficacy to the rhythmic accompaniment is not known. It is more probable that it is merely a convenient thing upon which to beat, hard enough to resound when struck.

The most important result of the expedition was the finding of a distinct differentiation between the Papago and Pima coiled basketry, a technic to the perfection and decoration of which these tribes have devoted their leisure time and effort. Such a technic in any tribe acquires the highest development of the arts belonging to that particular people, thus receiving the impress of a character of its own.. Here the coiled basketry of these linguistically related tribes was found to have such distinguishing and diverse qualities as to make apparent that the art in each tribe was distinct. This discovery gave the incentive to secure as many as possible of the few remaining old-time water-tight bucket-baskets of the Papago. This was done, resulting in a collection, which with two old basket bowls from the Lumholtz expedition of the previous year, make this small but choice group of old Papago coiled ware, not only unique, but rare, since very few of these baskets remain, owing to the influx of civilization and the Papago custom of burning at death all the belongings of the deceased.

Only the beginning of a very interesting study of the differences in

Papago and Pima coiled ware has been made, an investigation which has every appearance of being an important one, since the facts gathered show this cultural difference in the tribes and possibly point, as suggested by Dr. Fewkes, who has examined the results of the expedition, to a further discovery that the Papago are related to the old prehistoric people of the area. Further research, especially in the unfrequented villages in the foothills of the Quijotoa, Comobabi, Baboquivari and neighboring ranges, will no doubt throw additional light on the age of coiled basketry, its design names, and the old design itself, for frequently direct design study yields more satisfactory results than dependence upon Indian report.

These differences have every appearance of being a direct result of personal characteristics, for the individual traits of the tribes seem stamped upon the baskets of each. Papago baskets with solid substantial qualities resemble dominant Papago peculiarities; Pima baskets with lighter more pliable properties represent the Pima temperament. Some of these dissimilarities are due to the materials employed in manufacture and some are a result of function, thus accounting for certain structural diversities, namely, flexibility and solidity, beside general items of shape. But these utilitarian agencies give no satisfactory interpretation to divergence in design, or the finer subtler qualities in proportion, contour, build, and finish.

Reaching backward into the past to interpret the art of the coiled basketry in times gone by, reveals interesting data as to habits and methods, but the present also offers data for record, since Papago and Pima basketry means to the world today the art as it is now being practised. An important contribution to the subject, therefore, is a registry of present-day practice, as influenced by the influx of civilization, since each tribe has responded to this impelling agency, but in different ways.

The basketry of these desert tribes illustrates, in an individual way, the relation between the arts of people of lower culture and their environment. On this account, and to facilitate comparison, their habitat and its vegetation have been described at some length, for as plant life has become structurally modified to harmonize with surrounding arid conditions, so basketry construction, through man's instrumentality, has in a similar manner been adjusted to the desert flora. Suitable material for a number of common basket technics is lacking, and so excludes these; available material for those that are present, is in such limited quantities as to demand the exercise of much skill in discovery, selection, and adaptation. As would be expected, these technics show a most interesting interrelation with desert materials, which on account of the general distribution of the same plants throughout the area, furnish both tribes with certain similar technics; and owing to the location of other materials in the habitat of but one tribe, supply each

with a different technic; while because of a slight differentiation in the materials employed on a similar technic, distinct characteristics are given to each.

Of the technical points introduced, perhaps the most valuable is the suggestion of a possible evolution of two technics in the region — wrapped and lattice wrapped weaving, and foundation coiling. Another important item is the presence of the plaited center on coiled basketry which suggests that plaiting was here an earlier technic than foundation coiling. Considerable effort was expended in obtaining the rhythmic movement in the construction of plaiting, a movement which is always in threes, as it was thought this might prove an interesting likeness, or difference, to the rhythmic movement on plaiting among other tribes, and also give some further knowledge as to development of counting, or number, among people of lower culture. Detail in the technic of lace coiling seemed of value because of the elaborateness in pattern on the kiaha carrying frame which is fast passing into disuse. To make clear any technical terminology which might be misunderstood, the basketry classification made by the writer in 1909, and which this paper follows, is added as an appendix. (See *Science*, n. s. vol. 30, Dec. 24, 1909.)

Habitat.

The Papago and the Pima tribes are located on the Pacific coastal desert of southwestern United States and northwestern Mexico. The habitat of the Papago, Papagueria, occupies the southern portion of the area, and extends from the Gila River southward over a considerable part of southwestern Arizona and of Sonora. The region is an undulating plain with an elevation, at its greatest height, of about three thousand feet, from which it inclines gradually toward the west. The territory is crossed by broken mountain ranges extending north and south, whose slopes have been greatly reduced, mainly by wind erosion, which has swept the soil into the flat valleys between. In Arizona, these valleys are dry, except that of the Santa Cruz which is drained by a characteristic desert stream. This river has a flow of great volume in the rainy season, but one so inconsiderable during most of the year that it might aptly be termed a brook. To the west and south of the Santa Cruz Valley is that of the Santa Rosa, long and narrow in shape and, as has been indicated, of the dry type. Through it, in all probability, there once flowed a great river which is now covered with soil from the mountains on either side. This is the very center of the Papago country, for in the foothills of the Quijotoa and Comobabi mountains, which border the Santa Rosa Valley, and the neighboring Baboquivari Range, are scattered many of the Papago villages. Possibly in no other spot in North America has the Indian been less influenced by white men, so that old customs persist, even to the tattooing of the face by the older men and women. It was the villages of the Santa Rosa Valley and foothills, together with those of the Santa Cruz near Tucson, which were visited by the expedition, including San Xavier, Kioto, Little Tucson, Indian Oasis, Big Fields, Cababi, Comobabi, Vinumuku, Conquien, Quijotoa, Kuvuhea (Chewak), Twavaheu, Brownell Camp, and Noepa.

Many of the permanent villages are located in the foothills, where there is better grazing ground for the herds and water can be reached by sinking wells to the depth of from twelve to forty feet, while in the valleys it is estimated that water cannot be reached short of two hundred feet. Nevertheless, it is in the flat, dry valleys that the villagers plant their fields, since the Papago primarily are agriculturists, although they also obtain wild food, both vegetal and animal. The water supply for the fields is furnished by the scant rainfall, and by surface water which collects during the rainy season in a few water holes. From these, it is distributed by means of irrigation ditches. At the planting and harvesting season, the villagers move down into the valley, and usually remain there until the water holes

are empty. Upon quitting the fields for the foothills, they station a few of their number to act as watchers, who care for the crops. This seasonal migration between foothills and valley means a change of habitation four times during the twelve months, owing to the fact that there are two crops annually. The frequent moving, however, does not seem to disturb the Papago Indian in the least, for with apparent ease he loads his wife, children and household effects upon a couple of horses, or burros, and starts off, himself on foot. These beasts of burden, almost hidden beneath bundles, baskets, pots, women and children, are not unusual sights as they follow some lonely trail across the desert. When the migration will take place is uncertain, since weather conditions are so changeable. So it often occurs that one reaches a village in the foothills at a season when one would expect the Indians to be there, to find most of the huts barricaded and many of the people gone to the fields; or one reaches the fields in the valley, to find they have departed for their homes in the foothills, since the varying atmospheric conditions of the desert require a similar adjustment of domestic affairs to fit the requirements of the crops.

These arid valleys only need water to make them fertile gardens, for even with the limited supply at hand the soil yields two crops annually. Wheat, maize, beans, pumpkins, squashes, and melons are most cultivated. The seasons for planting and for harvesting must, of course, vary with the irregularity of climatic conditions, so that wheat is sown sometime between October and Christmas, and gathered about May; corn is planted in the neighborhood of the first of August, and harvested sometime in October. Formerly, the men cleared, planted, and irrigated the fields while the women gathered all the crops with the exception of the wheat. This was transported by the men on horses, whereas the women carried the other products in their kiahas, or carrying baskets on their backs. Woman's labor in the field has been greatly lightened by the introduction of a few modern conveniences, notably that of the wagon. However, when her help is needed, she is seen in the fields performing her old duties as well as those of the man.

The habitat of the northern group, the Pima, lies to the north of Papagueria, in two river valleys, the Gila and the Salt. These rivers during the rainy season are rushing torrents, but through most of the year their beds are entirely dry. Nevertheless, even these fluctuating streams have drawn the Pima villages to their banks, since water, one of the greatest necessities to human life in any climate and doubly needful in an arid land, has attracted the Indians to the neighborhood of its supply. The Pima habitat is much smaller in extent than Papagueria, and its villages are much more closely grouped. Those visited at this time were Kuu Ki, Hassanykuk, Saopuk, Talsituk, Oskuk, Wetcurt, Rsotuk, Hermho or Amn Akimult, and Babychurl.

Like the Papago, the Pima subsist upon both animal and vegetal food, although mostly upon the latter, and usually upon that which is cultivated. Their fields are not at a distance as are those of the Papago, but adjoin the villages, or are in the near neighborhood; thus migration between village and field as practised by the Papago Indian is not necessary. The water supply for the fields was formerly furnished by the rivers, but now that the white man is making use of the headwaters of these streams, and diverting a considerable supply, it has become necessary for the Pima to depend more and more upon wells. The fields have suffered greatly from this use of well-water, and are in a much poorer condition than when they could depend entirely upon the rain and the river-water, since the well-water is alkaline in character, and also lacks the enriching sediment which is brought down by the rivers. The products raised by the Pima and their methods of planting, harvesting, and transporting are similar to those of the Papago, although here customs of civilization have entered more largely. The seasons are slightly later than in Papagueria: wheat is sown in April, and reaped in June; a first crop of corn is planted in April and gathered in June, while a second crop of corn is planted in July, and harvested in October.

The desert home of these tribes is one of the most interesting spots on the American continent. Its lonely stretches, even in its most desolated parts, are not entirely without vegetal life, for it is thinly scattered over with stunted trees, hardy bushes, and prickly cactus plants. A cursory glance at the parched plant life and the baked earth makes it difficult to realize that only dearth of rainfall makes this region what it is, and that a supply of water would bring blossom and fruit in profusion, where now desolation spreads over much of its extent. Yet, it is the very desolation of these vast stretches, their immensity, and their impressive solitude which charm and fascinate. The broken mountain ranges rise abruptly from the plain. Their highest ridges are sparsely clothed with unexpected pines and oaks, for in consequence of their altitude the peaks receive an annual rainfall of thirty or more inches. With the lower mountains it is quite different, their leaden sun-baked slopes are mostly barren rock. The foothills show another change, as they again take on a vegetation, but one which is characteristic of the desert, with many strange spiny plants. In the valleys another vegetation appears, the typical plant life of the desert gives way to a vegetation with softer foliage, a direct result of more moisture. The scattered willows and cottonwoods along the river banks are examples of this. The valleys in Papagueria are usually long and trough shaped, flanked on either side by mountains, while those in the Pima country are more circular, and frequently surrounded on all sides by mountains.

This desert area with its low ranges and flat valleys is a land of sunshine.

One is impressed on entering the region of the dearth of everything save sunshine, for it is the dominant note. The summer sun pours down its pitiless rays, resulting in baked mountains, arid valleys, and parched vegetation. The winter sun, although less hot, continues to shine one day after another, with scarcely a cloud to mar the sunshine, and only a few rainy days in the wet seasons. It is during the short wet seasons of midsummer and midwinter that most of the rain is precipitated, and then the fall is only slight, except upon the highest ranges. Frequently there are years when there are no wet seasons, then the whole area suffers from drought, sometimes eighteen months pass without a drop of rain. In this dry land the sun has left its imprint everywhere and upon everything. Its intense heat has not only taken up every particle of moisture from the land, but from the air as well, leaving it remarkably light and clear. This clearness brings remote objects very near, greatly disturbing and preventing correct calculation of distances. It plays innumerable atmospheric tricks in this way, painting in the air at early morning and evening wonderful mirages of mountains and lakes, whose deceptive forms have frequently led many a weary traveler from his way, with disastrous results.

As has been said, the slight rainfall, the intense heat, and excessive evaporation have most perceptibly affected the vegetation of the area. All plant life has protected itself against the severe climate in most interesting ways, but with typical desert vegetation the adjustment is the most extreme, so that accordingly plant life has assumed shapes and structures particularly adapted to these adverse conditions. Some plants have enlarged their leaves and stems into thick pulpy forms, to act as absorbers of moisture and as storage reservoirs. An excessive amount of water can be collected in these thick forms during the rainy seasons, to serve as a supply for the plant during the periods of drought. Noticeable instances of these oddly transformed plants are the giant cactus saguara with its high fluted columns, at times rising forty or fifty feet in the air; the prickly pear with queer flat-oval jointed stems; and the melon or barrel cactus, which in its larger varieties, holds from six to eight gallons of water. This last cactus is most useful in this particular, as the water stored within it, has many times saved the life of man and of beast. Plants with enlarged stems are more fantastic in shape than those with enlarged leaves, yet these last are unusual, with their long leaves which encircle the central stem very much thickened for the storage of extra sap. Among these are the agave, or century plant, with spiked leaves of great weight; the palmea with narrower sword-like leaf, edged with saw teeth; and the yucca of similar shape, but with knife-like edged leaf.

Plant protection is not only accomplished by the storage of water, but

also by the preventative means taken for lessening evaporation. This is effected by diminishing the exposed leaf surface, and by coating the leaf and the stem. For decreasing the leaf surface, trees and shrubs may reduce the leaf to a very small size; they may transform them into spines or thorns; or they may dispense with the leaf altogether, when nothing remains but a bramble of stems. Someone has very aptly likened one type of desert plant, the cactus, to a great pin-cushion whose pins have the points turned outward. This very vividly impresses itself upon one in a land where there are hundreds of different cacti all bearing spines, for even the ground is not exempt, but is covered with small varieties whose sharp points even pierce through shoe leather.

An excellent example of the taller plants with pin-like foliage is the beautiful cholla. It is a strange shrub-cactus with a ragged foliage in great bunches of barbed spines, and presents a most imposing appearance, like a huge bouquet of silver-green thistles, with a sprinkling of pale yellow in fruiting season. Two other plants of the bramble type are the crucifixion thorn, with exceptionally long needle points, and the ocatilla, with long willowy stems, which in the wet season bears fine little leaves, but which in the dry season are replaced by thorns. A slight acquaintance with weather conditions on the desert, makes very clear the reason for this scant foliage, and explains why so many plants are thorny. This, however, is but the part of the protective scheme with which nature arms herself to shield herself from the weather; for the bristling forms also keep away animals which might attempt to get too great a quantity of the stored water, so much desired by them, but equally necessary for the preservation of the plant.

A second means for lessening evaporation is employed by all kinds of plants, it is a coating of the leaf and stem surfaces with an impervious covering. This varies with different plants, as some have hardened and waxed the skin, while others have shellacked it with a resinous substance like varnish, but all in one way or another, have brought the surface to a close texture or glazed it. In these ways vegetation has protected itself: the cacti with many spines; the beautiful paloverde with coated green stems and feathery foliage; the mesquite with long roots, seeking deep underground moisture; the occasional willows and cottonwoods along the dry water courses, together with the few other plants. Forbidding as this region may seem, the charm of its weird and wonderful vegetation, its clear atmosphere, its sunset colors, its mysterious night, and its phantom mirage, makes it far from an unpleasant spot. To the Papago, in their foothill villages among the mesquite and the cactus, and to the Pima, among the cottonwoods and willows along the Gila and the Salt, belong the beauties of the desert as well as its many discomforts and limitations.

The general physiographical and botanical characteristics of this desert home have been lightly sketched as they are so strongly reflected in the textile arts of these people. As plant life has been compelled to adapt itself to the physiographical and atmospheric conditions of the arid environment, so likewise the Indian has had to follow in the same path and fit his arts and industries, his devices and methods of meeting daily needs to the conditions of his physical surroundings. Destitute of material suitable for textile work, as this environment may seem, these Indians have adapted that little to their need. This, of course, is true of all aboriginal industry, but the extreme conditions of the desert simplify things to the lowest terms, so that it is easy to trace influences and to draw conclusions because they are so self evident, as is impossible to do in regions more copiously supplied by nature.

Influence of Environment.

It is a recognized fact that the culture and industry of any civilized nation is biased to a large degree by the geographical characteristics of its locality, for there are "ties infinite in number, which bind life to the earth." [1] Even more easily traced is the bias imposed by the climate, topography, flora and fauna of a region upon the arts and life of people of lower culture, since here means of communication and transportation are restricted, although not entirely limited, but enough so to render exchange with distant peoples impracticable. The dependence of the culture of early peoples upon environment is a subject widely discussed by ethnologists, who have shown conclusively the stamp it has placed upon the arts of a particular area. Likewise, the studies of ethno-botanists have pointed out very definitely, though in a narrower field, the relationship between plant life and the technic employed in the various industries. In none of these industries is the interdependence more pronounced than in textile manufacture, for as Mason has said:—

> There is no work of human fingers that furnishes a better opportunity for the study of techno-geography, or the relationship existing between an industry and the region where it was developed than the textile art.[2]

The reason for undertaking this much considered topic in its relation to the basketry of these tribes, is because it works out with such nicety in the Papago-Pima geographical area. Environmental influence can be traced in the textile arts of any locality, but it is more adequately shown

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[1] Brigham, P. "Problems of geographic influence," *Science*, Feb. 9, 1905.

[2] Mason, O. T. "Woman's share in primitive culture," 41.

in an arid region. The very scantiness manifests this minutely and the governing influence discloses it more plainly, so that dearth of materials makes possible the drawing of closer distinctions and surer deductions than could be made in a richer environment. When one recalls the vegetation of this region, as described in the last chapter, he will surely ask, "Where indeed among these parched, spiny plants and shrubs can be found suitable material for the manufacture of basket receptacles and utensils in which to collect, store, and prepare for cooking the various foodstuffs, and to supply other household demands?" With all the protective means employed by desert plants to keep them provided with moisture, none seems sufficiently successful in this, to yield other than brittle dried-up stems and twigs, so that suitable material is indeed scarce. Nevertheless, the Indian woman finds that even the desert affords a sufficient supply, although it requires much effort and skill to discover just what is of value. Long years of painstaking search were necessary in the preparation and adjustment of these to the function at hand, but in all this she has been successful. The manner in which the Pima and Papago women have made this selection and adjustment, the way they have economized the scant supply of the few best materials, and have adapted to the greatest advantage the less desirable ones, show much ingenuity and invention.

Like all desert regions, this one furnishes many unique examples of the adjustment of plant life to climatic conditions, as pointed out in the foregoing chapter, where it was shown how the geographical surroundings had hindered plant growth, and how plant life in its desperate struggle for existence had effected an adaptation to overcome hindrances of habitat, by bringing to pass certain physical changes, such as modifying the structure to provide for the storage of moisture and to prevent the loss of the same by evaporation. In like manner, this desert vegetation has exerted an influence upon the material activities of the tribes, and the tribes in turn have adapted these activities to the limitation of the desert. Indeed, these austere conditions have rendered it necessary to put forth strenuous effort to perfect the adjustment. It is interesting to trace in Papago and Pima basketry, the restrictions imposed by the thorny, spiny vegetation, which proves but crude material for basket work. These brittle spiny stems and leaves set their imprint upon this art, and determine to a large degree the method of construction, both as to kind and quality of technic, for as marvelously as the vegetal life of the region shows the effect of adverse conditions, just as wonderfully does the basketry exhibit the imprint of the unsuitable materials furnished: Papago basketry that of the plant life of the foothills; Pima basketry that of the vegetation of the river valleys. Thus, because of the material required in the construction, certain technics are allotted to

both tribes, and others are assigned to each tribe, while similar technics common to both show noticeable variation from the same cause, that of available material.

The most striking fact in the relation between environmental conditions and the basketry technology of the region is that this agency has excluded the two most common kinds of weaving, wicker and twined, which are generally found in regions where basketry is practised. The usual plain weaving, or wicker, a technic almost universally employed by aboriginal peoples throughout the world when a heavy style of construction is demanded for rougher domestic purposes, is notably absent. Wattling, or twining, another type of weaving which, with wicker, is an equally frequent technic for strong basket ware the world over, is also not present. An abundance of bendable twigs, or splints is required for the manufacture of these two technics: strong, slightly flexible ones for the foundation element, and slender supple ones for the binding element. On the desert, pliable twigs, or even semi-pliable ones are scarce, and the scant supply from the few willows and cottonwoods along the streams does not warrant their use in the wholesale manner demanded by wicker and twined weaving. The few pliant twigs are too precious for this; each twig must be made to cover as great a surface as possible by being split many times and thus serve as a number of strips. The utilization of these thin strips necessitates another kind of basketry than that of weaving — coiling — where a more economic employment of the limited flexible material is possible. Hence, the exclusion of the heavy openwork technics of wicker and twined weaving and the development and extensive use for heavy coarse structures of the third type of weaving, wrapped weave, a technic whose presence is due to desert conditions (Figs. 1–10). Dearth of sufficient material, save stiff slats and rods for the foundation and strips of hide, thong, and other cord-like material for the binder, make possible wrapped weaving of two varieties, plain wrapped weave, and lattice wrapped weave (p. 140). Here the technic serves most frequently for staying and strengthening bands, quite rudely made, and difficult to recognize as similar to the close textures of lattice wrapped weaving on bags and caps of the Nez Percé Indians, baskets and hats of the Makah Indians, baskets of the people of the Lower Congo, or the colored borders of the beautiful flax robes of the Maori of New Zealand, where finer materials make possible these closely woven and refined textures. Neither can it be compared with the coarser strong openwork wrapped weaving of the Filipinos, or the Malay Islanders, who have at hand the pliant bamboo in place of the stiff desert materials of these tribes.

The materials here are of the crudest kind. The giant cactus, Saguara (*Cereus giganteus*), has a wide distribution in the higher and lower foothills, with a scattering down to the plains, and is therefore accessible to the

inhabitants of the foothill villages and not far distant from those in the alluvial bottomlands. It is split open, and the great stiff ribs furnish light firm rods and slats which will serve as a firm foundation element. The long roots of the widely distributed mesquite tree (*Prosopis veluntina*) supplies another material, but one harder to get, as it must be dug; still, it has a serviceable quality when a curved foundation element is desired, as for cradles, since it can be bent when still green. In the valleys the cactus is supplemented by another equally suitable material when small foundation rods are needed, the stems of the arrowbush (*Plucea borealis* and *Plucea sericea*). A pliable binding element was not so easily discovered, since plant life yields nothing save the too precious willow and cottonwood twigs. So the Indian woman was obliged to search elsewhere, and has found in animal sinew and thong suitable binding materials, while civilization has added two others, strips of cotton cloth and wire.

Another technic found in both tribes and one contrasting sharply with the heavy wrapped weaving is lace coiling, a light airy basketry technic made possible by the presence in the region of the fiber yielding plants: agave (*Agave sp., Agave heteracantha* and *Yucca elata*) among the Papago; and the maguey (*Tasylirioni Wheeleri*) among the Pima (see p. 225). As these plants grow in the higher hills of the two habitats they are easily accessible to both tribes, although to procure them the Pima must journey farther from their home in the valley than the Papago from theirs in the foothills. The tribes constructed their kiahas or carrying frames of the lace coiling. The early Pima kiaha, judging from the one collected by Edward Palmer [1] in 1885 and now in the Smithsonian Institution, differed in shape and intricacy of technic from that used later by both tribes, and now made exclusively by the Papago. Its inverted cone shape was taller and more tapering, the open lacework was of simple design, with the appearance of having been made entirely for service. Its frame was not prominent or distinctive, neither did its four poles extend below the lace cone, and only a short distance above. They crossed just below the lacework, and then followed the lace wall of the slender cone to its rim without much spread, and were cut short a little above it. This Museum also has a small kiaha (65–168) of similar shape collected in 1895 from the Cora. Its frame is of a wood like bamboo and its lace covering of simple design. The Papago kiaha of twenty years ago is notable for its elaborate openwork covering and conspicuous frame (Figs. 75–79), and its form is a more shallow cone, in contrast to the deeper cone of the early Pima shape, while the covering is not of plain lace coiling, but one with complicated pattern, surpassing in elaborateness that of lace coiling from other tribes. The framework also dif-

[1] Mason, O. T. "Primitive Travel and Transportation," *Rept. Nat. Mus.*, 1894, 470.

fers from the early Pima kiaha frame as it holds a prominent place, stretching its four poles far above and below the lace cover, with a rapid spread as they follow the wall of the shallow cone. Two of the lower ends continue some thirty centimeters below where they cross (Fig. 75), thus affording a support when the kiaha stands for loading, or when not in use; likewise, two of the upper ends, the front ones at times reach a length of ninety centimeters (Fig. 80–81). It is these spreading, sprawling poles which give to the Papago kiaha its strange spider-like appearance (Figs. 75–81).

Kiaha use has experienced a change within a score of years. Twenty-five years ago there were two styles of kiahas, a Pima type, and a Papago type, while today there is but one, the old Papago kiaha. The information gathered from the Pima women in 1910–1911 showed that most of the kiahas in use for the past fifteen years, had been purchased from the Papago either in completed form, or in a finished lace cover, ready to be stretched on a frame. Two women reported that they had made the lace cover themselves, but both had procured the fiber cord from the Papago. No woman was found who had gathered the maguey leaves and made her own cord. Still Frank Russell,[1] from information gathered in 1901–1902 describes the Pima women as gathering and preparing their maguey leaves, spinning the fiber cord, and fabricating the kiaha of the Papago. It is probable that there were then living elderly women, now gone, who still held to the old practice of maguey gathering and cord-making, but who in the transition had adopted the more beautiful Papago type, like those which neighbors were procuring through trade. Why the Pima began to purchase the Papago kiaha can have but one logical explanation, that of environmental influence. The transportation facilities brought about through the introduction of the horse and wagon, made it easier to trade for the kiaha with the Papago, whose material was nearer at hand, than to climb to the distant hills for maguey. The giving up of the old Pima type would naturally follow, and during the transition which preceded this, the copying of the more beautiful Papago kiaha would be an easy matter and a normal sequence.

As rigid materials, together with sinew and thong, have given wrapped weave to both tribes, and fiber plants have provided the lace coil, so still other materials have brought a third technic, foundation coil (Figs. 35 and 59) of the coarse and close varieties (p. 190). The two elements which compose foundation coil, the binder and the foundation, perform different functions in technic building, and thus call for materials with unlike qualities. The exacting element is the binder, a narrow splint-like strip which does the work of uniting the adjacent rounds of the foundation, for this

[1] Russell, F., "The Pima Indians." *26th Ann. Rept. Bur. Ethno.*, 140–143.

active element must wind about the foundation coils in a tiny spiral catching them together. Stiff materials are impracticable for this, as they crack and break. The foundation element needs less care in its selection, harsher materials may compose it, since it is simply a bunch of splints loosely coiled about the basket as a passive foundation, over which the binding element moves, by first encircling it and then passing through the upper edge of the last round of coiling before taking another turn about the foundation. Thus, one can understand that the close winding spiral demands a flexible material and one of some strength. The shrubs along the banks of the one desert stream, the Santa Cruz, furnish the Papago a little pliable material for the light colored binding element, but throughout the greater part of their land, one material only is supplied the basket maker of coiled ware, the seed pod of the martynia, or devil's claw (*Martynia probosidea*) which contributes black binding splints for both tribes (see p. 202). In the Pima country, lying to the north and in a region a little less arid, vegetation changes slightly by the addition of a few desert streams, which although dry most of the year, receive sufficient water in the rainy season to sustain along their banks a few willows and cottonwoods, whose young shoots furnish the Pima with material for the light-colored binding element and some to trade with the Papago (see p. 199). Hence, both tribes are supplied with the materials for foundation coiling of the close variety. Materials for the coarse variety of coiling are supplied by each habitat: to the Papago, bear-grass (*Nolina erumpems*), young ocatilla stems (*Fouquieria splendens*), splints of saguara ribs (*Cereus giganteus*) and occasionally wheat straw (*Triticum vulge*) for the foundation element and mesquite (*Prosopis veluntina*) and other barks for the binding element; to the Pima, wheat straw for the foundation, and willow (*Salix nigra*) and mesquite (*Prosopis veluntina*) barks for the binder.

As has been seen the general distribution of certain plants over the entire area has apportioned to both tribes the basketry technics of wrapped weave, foundation coil, and lace coil. A more limited distribution of different plants in the two habitats assigns to each tribe a distinct technic: crude coil to the river villages of the Pima and plaiting to the higher foothill villages of the Papago. In the Pima country the two rivers, the Gila and the Salt, although fluctuating streams and dry most of the year, supply in addition to the cottonwoods and willows, the water shrub arrowbush (*Plucea borealis*, and *Plucea sericea*). This furnishes a type of basketry found in very few parts of the world, as it appears to be solely a desert technic, and to have developed where there is a scant supply of basket material as in south-western North America. The technic is crude coiling (see p. 172), which constructs the peculiar shaped granaries seen upon many of the houseroofs

or raised platforms (Figs. 29–30). These old nest-shaped structures with overhanging covers are an elementary coiling (Fig. 27), extensively found among the Pima, but wanting, for lack of suitable material, among the Papago. An exception to this was found in two hive-shaped granaries of this technic seen in one Papago village near the Santa Cruz (Fig. 28), where material of this character was obtainable. It seems quite probable that dearth of refined material suitable for the more perfect technics, especially the scarcity of pliable binding elements, must have been largely responsible for the development of crude coiling.

The Papago have sought the heights of their land in preference to the dry valleys since they are dependent upon wells for water which is reached at less depth there than in the valleys. This location gives them access to the thick-stemmed, thick-leaved plants of the higher altitudes: the giant cactus, agave, yucca, and palmea. Of these, one of the most important for basketry is the palmea (*Dasylirion Wheeleri*), growing on the dry rocky slopes of the higher foothills, four thousand feet above sea level. It is the only plant in the entire region now employed for plaiting sleeping mats, headrings, kiaha mats and headbands (Figs. 11, 19, 20, 75, 80), medicine and trinket baskets (Figs. 26 and 21, see p. 150). It is a plant quite similar in growth to the Spanish bayonet, and bears a long slender leaf of light green, edged with thorns. When cleared of these and split in half, it forms a suitable material for plaiting the mat-like surface of this technic.

All plaiting requires for manufacture bands of flexible material, but its three types demand different degrees of pliability. Checker plaiting needs the most supple, and no material in the region fulfils the requirement; lattice plaiting admits of less pliant strips, but they must be very strong, and no material is present which is sufficiently substantial and yet will bend without breaking. Material for the third type, twilled plaiting, is supplied by the palmea on the higher foothills, and since the Papago are great travelers, the short journey for this material is not troublesome. The arrival of civilization, with greater trade facilities, has linked even more closely the habitat and the practice of this technic by limiting plaiting to the few villages nearest the mountains, where each year more and more plaiting is done and less in the lower villages, so that from the Indian women of the higher villages plaited articles can be obtained by the Papago as well as the Pima. Occasionally, to be sure, there is found an old woman in some of the other Papago villages, who prefers to continue the old art and do her own plaiting even if she is put to considerable inconvenience in procuring material. A great many years ago, plaiting was done by the Pima, but owing to the shutting off of the headwaters of their two rivers by the white men, these streams are dry during most of the year, and the one suitable plaiting material, the river plant, *Phragmetis communis*, which formerly

grew along their banks is no longer found. This river cane was a stiffer and less durable material and much more difficult to manipulate than palmea, so that its use was limited to mattings as it was unsuitable for baskets, or articles not flat. Hence, because of this change which cut off the material, the Pima do not plait as of old, and altered conditions have restricted the technic to the Papago.

The presence throughout the entire area of the three technics: wrapped weaving, foundation coiling, and lace coiling, owing to the general distribution of certain plants has been discussed; as has also the allotment of a distinct technic to each tribe: to the Papago plaiting and to the Pima crude coiling, because of a particular plant material found in each habitat. There is still to be considered the influence of the vegetation in each habitat upon a technic common to both tribes, that is foundation coiling, with its two varieties, close and coarse coil (pp. 179 and 190). As has been said, the manufacture of close coil is very greatly hindered by the scarcity of material for the flexible binding element, calling forth interesting economic adaptation of the scant supply. But it is the foundation material that is of interest here, for although it does not need qualities of flexibility, strength, and adaptability to the degree called for by the active binder, its characteristics have a marked influence upon the finished product in qualities of build, texture, and accuracy in technic. The material commonly employed by many tribes for the foundation element of close coiled ware is willow splints, but as a great quantity is consumed by the foundation, this region does not afford a sufficient supply to meet the demand and the scant amount is too precious for an extensive use of it. Therefore, the Papago ordinarily employ beargrass (*Xolina crumpems*) from the foothills, or occasionally Spanish bayonet (*Yucca baccata*); and the Pima use cat-tail (*Thypha angustifolio* Linn.) from along the streams, or less frequently brittle cottonwood splints (*Populus fremontii*) (see p. 198). The use of unlike materials would obviously affect the finished technic and this is demonstrated by the contrasting qualities which these materials have left upon the close coiling of these tribes, for the harsh beargrass gives to the Papago basket a heavier, stiffer, and firmer construction and to the Pima a lighter, thinner, and more pliable one which is also less durable (see p. 251). From the abundance of martynia and the lack of light-colored binding splints in Papagueria springs another modifying agency, which results in a dominance of black in Papago ware; but even where both dark and light material are present, the greater difficulty in preparing the martynia splints, results in a dominance of light in the Pima ware (see pp. 202 and 250).

As noticeably as is close coiled ware in the two tribes differentiated, because of distinguishing qualities given by the materials, so also are the coarse coiled granaries, since here also unlike materials have left their

imprint upon both the shape and the quality of technic (p. 183). The Pima foundation material is wheat straw, a smooth, even, shapable material; the Papago is beargrass, young ocatilla shoots, or strips of the inner rib of giant cactus which can be split like bamboo, and very occasionally wheat straw, all materials much less pliable and harsher to handle. The Pima binding materials are the bark of willow, mesquite, and other trees; that of the Papago mesquite bark and yucca. The controlling agents here, as in close coil, are the foundation materials, whose qualities are responsible for the dissimilarities. Their influence on form gives to the great globular and bell-shaped granaries of the Pima, using the more pliable wheat straw, a shapely contour and beauty of line; and to the barrel shapes of the Papago, using beargrass and other harsh materials, a less symmetrical basket receptacle, with imperfect outline (Figs. 34–35). Influence of material even extends to the quality of technic, since the wheat straw multiple foundation can be more skilfully managed, allowing an evenness to the technic and a precise arrangement of the spiral segments of the binding element which runs in lines from the base to the rim (Figs. 32 and 34). Not so with the Papago granary, the harsh unwieldy materials do not conduce to anything but a rough "hit or miss" setting of the spiral segments of the binding element (Figs. 33 and 35).

Wrapped Weaving.

The earliest basketry of this locality, in all probability, is a weaving technic constructed of a series of parallel rods forming the warp, and a uniting weft. The commonest types of weaving, wicker and twined, are, with one minor exception, not present, since there are no suitable materials

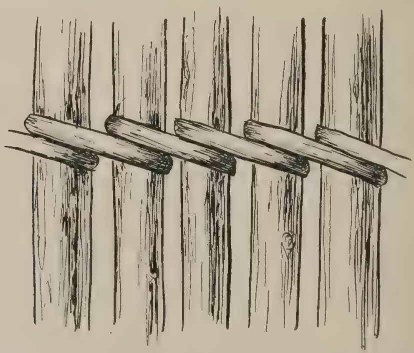


Fig. 1 (50.1–5279). Wrapped Weaving Technic.

for their manufacture. Basketry wicker work, or plain weaving, which finds an almost universal use in coarse openwork structures, and which has perpetuated itself in the loom weaving of the modern power loom, is

distinguished from other types of weaving by its interlacing weft. Twined weaving, another substantial technic which is almost, if not quite, as widespread in use, and which thus far no machine has succeeded in imitating, is distinguished by its twining weft of two or more strands. The third type of weaving is wrapped weave, a technic found here in two varieties, simple wrapped weave and lattice wrapped weave. The weft of this type does not

Fig. 2 (50.1–4861ab). Lattice Wrapped Weaving Technic: *a*, **front;** *b*, **back.**

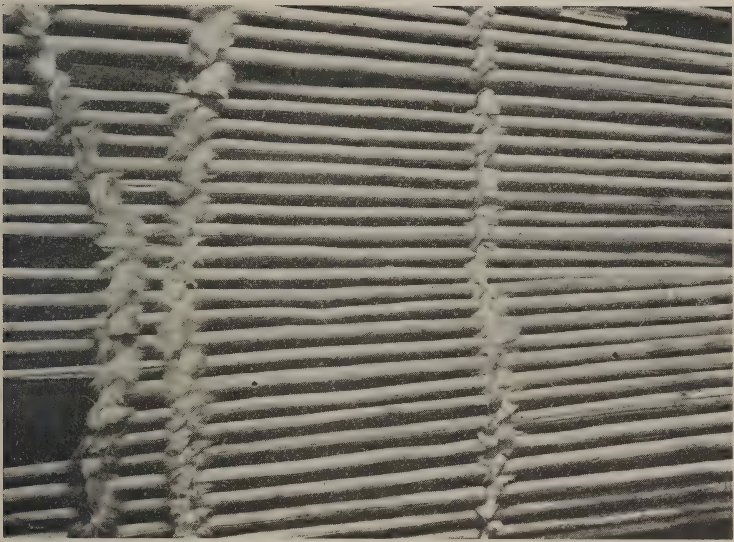
interlace through the warp strands, as in wicker weaving, neither does it twine about them as in twined weaving, but it wraps about each rod of the parallel warp series (Fig. 1). Lattice wrapped weaving is more complicated and stronger than wrapped weaving, as it employs two series of parallel warps crossing each other at right angles. These are bound together at their point of crossing by a wrapping of the weft strand about them (Fig. 2).

In early days, this interesting old weave, crude as it is, supplied many needs of the Papago and Pima. It furnished large, strong openwork structures such as coops and cages in which to keep live wild fowl caught for food; hanging shelves upon which to suspend animal and vegetable food to protect it from rodents, and the ravenous coyote; doors for the huts and storage sheds; and cradles for the infant. All these are fast disappearing with the influx of civilization, indeed, only four basket doors of simple wrapped weaving were seen in the two dozen villages visited. These pliable doors fold back upon themselves, as the soft weft binder of skin thong which

Fig. 3. Oldest Type of House showing a Door constructed with Rows of Wrapped Weaving.

unites the parallel slats of giant cactus rib constructs a mat-like form which will roll from the two sides (Figs. 3–4). Old oval shaped sieves with a strainer of wrapped weaving, are even more scarce (Fig. 5).

The hanging shelf still finds frequent use, where it is seen suspended from the beam of many of the arbors and storage sheds. It is habitually piled high with all sorts of provisions, baskets, pots, and other things. Civilization seems to have made no change in this shelf of lattice wrapped weave, except that in many instances the material for binding together the warp sticks of cactus rib, or other wood, is of store-bought string, strips of



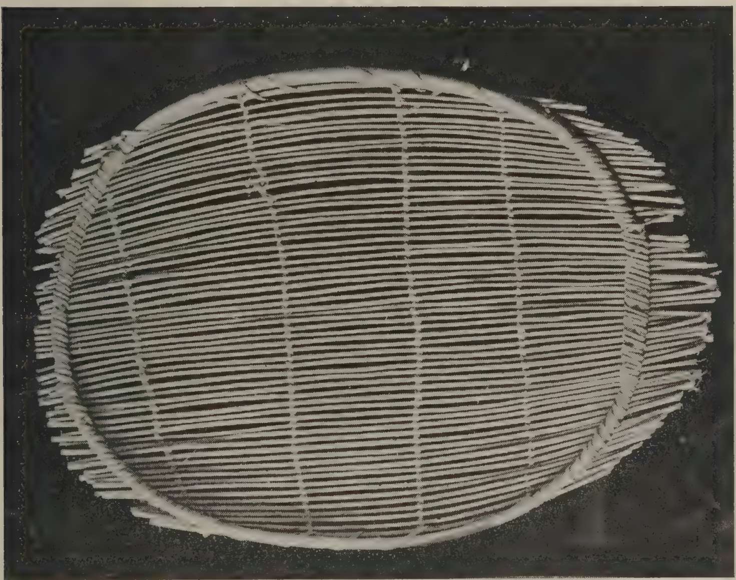
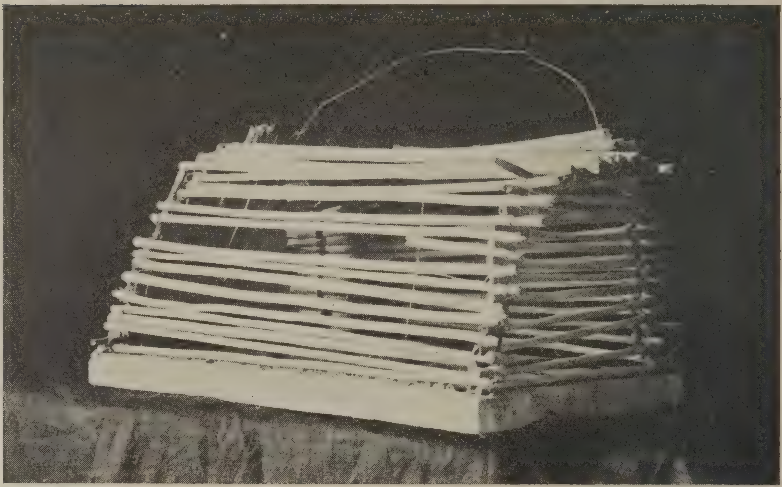


Fig. 4. Detail of Door of Wrapped Weaving shown in Fig. 3.
Fig. 5 (U. S. National Museum). Sieve constructed of Wrapped Weaving.



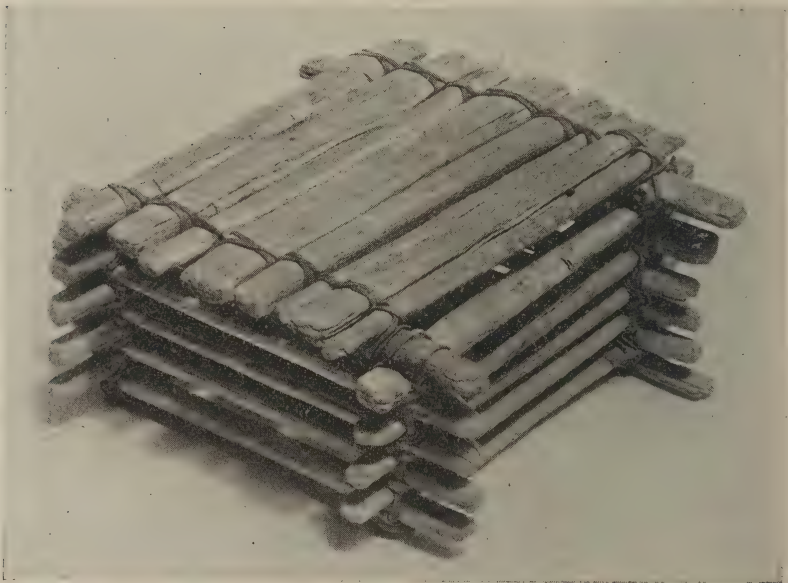


Fig. 6 (U. S. National Museum). Cage constructed of Lattice Wrapped Weaving.

Fig. 7 (50.1–4861). Rectangular Coop of Saguara Ribs and Thong constructed of Lattice Wrapped Weaving.

Fig. 8 (50.1–5235, 4537, 4538, 4628, 4554, 5131). Pima Hair Brushes. Varieties of wrapping shown ranging from the crudest binding to ornamental weaving in designs.

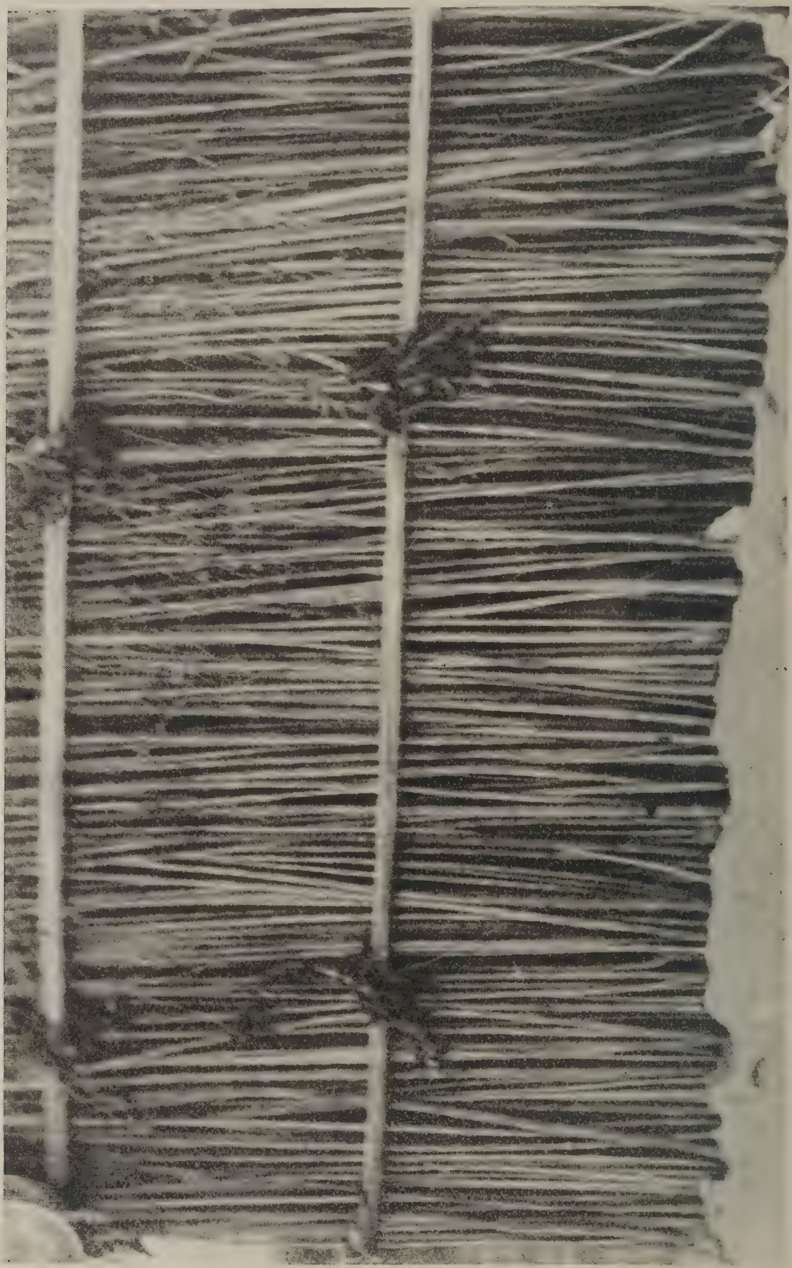


Fig. 9. House Wall. A latticed construction with knottings of willow twigs which may have been the beginning of the lattice wrapped weaving.

cotton cloth, or wire. The coop, or cage, of lattice wrapping is usually rectangular in shape, although at times it is supplied with a rounding top. Sizes as well as materials also vary, although saguara ribs and skin thong are the more usual (Figs. 6–7).

The most common material for the warp element of this weave is the giant cactus (*Cereus giganteus*), the ribs of whose great fluted columns furnish a straight, light, porous wood, which serves admirably as foundation rods on house doors, cages, and the larger shelves. Another material is arrowbush (*Plucea borealis* and *Plucea sericea*), whose larger stems are both straight and uniform in diameter, and which, although of smaller size than the cactus ribs, are suitable for articles where smaller warp rods are needed. The most usual binding elements are thong, the hide cut in strips and slightly twisted; and sinew from the back and legs of deer, split into fine shreds. Cradles are constructed of the mesquite root (*Prosopis veluntina*), saguara ribs, cat's claw (*Acacia Greggii*) and willow (*Salix nigra*); with a binding element of sinew, thong, or fine mesquite roots, used while still green. Papago hair brushes are generally of agave fiber (*Agave sp.*); those of the Pima are of grasses, the tripled awn (*Aristida californica*), and Sacaton grass (*Sporobolus wrightii*); of grass roots; of yucca fiber (*Yucca baccata*), or agave fiber (*Agave lecheguea*).

The crudest form of wrapped weaving occurs on the hair brushes of the locality. The technic is merely a winding and fastening, as the fiber, grasses, or roots are simply bunched together and wrapped toward one end, at times with crude craftsmanship, at others more perfectly (Fig. 8). A more advanced wrapping, sufficiently so to be termed wrapped weaving, is that found on the house doors, sieves, and stirrers (Figs. 3–5). Here the rods and stems of cactus ribs, arrowbush, or other stiff materials, are laid in a parallel series to form warp, and the pliable weft of sinew, or skin thong, is wrapped in a single strand about them. This moves across the parallel series forward over two rods in front, between the rods, backward over one rod behind, and between the rods to the front, to again repeat the process, and so continue until the series of warp rods are all united (Fig. 1). More of such lines placed only close enough to stay the rods complete the surface seen in Figs. 3–5, producing a rough, pliable technic of wrapped weaving, which is widely distributed among peoples of lower culture.

An elementary basket technic enters into the house construction of these tribes, a crude form of lattice wrapped weaving, for a vertical series of parallel slats are crossed by a horizontal series, and knotted together at intervals by a bit of green twig, or of bayonet leaf. Fig. 9 shows a part of the wall of such a brush hut, with its basket-like technic of wrapping. A framework of the trunks and saplings of cottonwood, or willow, is first

erected, whose walls are built of standing stems of ocatilla, or arrow-bush, and securely held in place on both the outer and inner surfaces by horizontal slats which cross the vertical stems at short distances apart. The process of uniting the outer and inner horizontal slats to the upright stems is a wrapping and then a tying of the binding twig, or leaf, and differs from basketry lattice wrapped weaving only in this tying. The widely separated joinings in hut construction, because of the distance between, necessitates a breaking of the wrapping movement, which in the closer joints of basketwork is carried in a continuous and unbroken movement from one joint to the next (Fig. 2). The short lengths of the binding twig, or leaf, will answer the purpose in house construction, but a longer element, one of sufficient length to wrap several joints and usually supplied by skin thong, or sinew, is required for lattice wrapped weaving.

The crudest form of lattice wrapped weaving of the Papago and Pima is found on their cradles, a formerly used article, but one which owing to conditions of change has almost disappeared. The almost universal basket cradle of California and the adjoining desert region varies greatly in the different localities as to construction, shape, and decoration, but its technic always holds to some form of weaving, either wicker, twined, or wrapped, each in the region where vegetation is best suited to that construction. The most perfect cradle, both as to shape and technic, is made by the Hupa Indians of northwestern California, a slipper-like shape of twined twigs. Between this perfect form and the simplest is a long series of great variety, the crudest being that of the Tonkawa, Oklahoma, Walapai, Mohave, Papago, and Pima, which consists of a simple frame of rods and slats, bound together with a rough wrapping and double tying, quite similar to Papago and Pima hut construction. It is a technic which hardly can be dignified as basketry, but shows rather an interesting transition between the simple tying process and lattice wrapped weaving (Fig. 10).

The primary use of the cradle was not for transportation, but for putting the infant to sleep when it grew drowsy. Indeed, the child often cried for its cradle and was quiet when strapped in, but was always removed as soon as sound asleep. When employed as a carrier, the cradle frame was either placed on top of the loaded kiaha, or rested horizontally on the mother's head, with its arched hoop to the front for a handle. Older children were never carried in the cradle, but, as now, astride the hip supported by a strip of cloth or a shawl.

The arched hoop, or the foundation of the frame is of willow, cat's claw, or mesquite root, and more frequently of the last. The mesquite tree needs more moisture than other desert vegetation, so that in Papagueria it grows along the dry water courses, sending out its roots to great depth in search

of underground rivulets. In the Pima country it grows along the streams where its long projecting roots hang from the banks, reaching for river water. In the first region one must dig deep for these roots, and in the second trace far back into the bank to reach roots of sufficient size for the cradle frame. Upon bringing it home, the root is immediately skinned by means of the teeth and fingers, and should the skin be slow to yield it is loosened by being held over the fire. It is then cut twice the length of the proposed cradle, heated and arched by placing the foot upon its middle point and bending up the two ends and tied in position until dry, when the bent root retains its arched shape. At times the root is so soft that if taken while still green, it can be shaped without heating. The arched hoop having been prepared, cross bars of giant cactus rib are cut the length of the distance between the

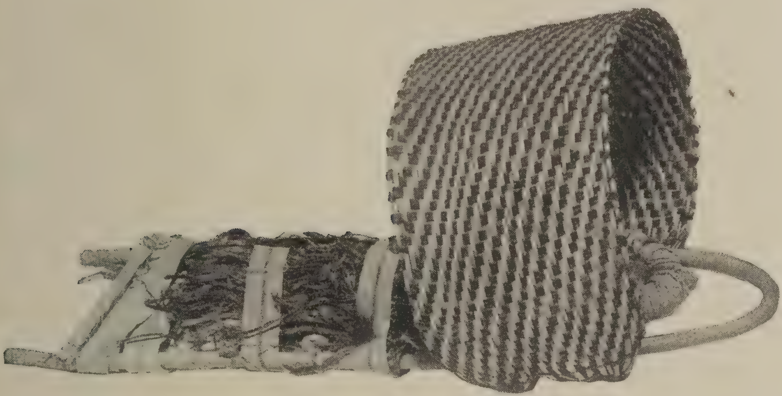


Fig. 10 (50.1–5248ab). Pima Cradle. The frame in this specimen is of crude lattice wrapped weaving, the hood of twilled weaving, the mattress of bark, strapped on by an old suspender of white man's manufacture.

arms of the cradle arch and bound to them with sinew, or thong, in a crude lattice wrapped weaving (Figs. 2 and 10), or attached by a coarse lashing.

The hood, or shade of the cradle, is constructed of splints of willow, or other pliable twigs, which act as the warp; and willow bark which supplies the weft. This interweaves into the split twigs in a twilled weaving of over two, under two, and in a design quite similar to that on mattings (Fig. 10), in zigzag lines, or in graduated squares, as on plaited mats and baskets (Fig. 15b). The Mohave Indians attach feathers and bits of bright flannel to the cradle hood, contrary to the Papago and Pima who leave them undecorated other than the design of the wickerwork. The mattress, to protect the infant from the cross rounds, is of willow bark or wads of cloth. The present-day straps for holding the infant securely to its cradle, are of plaited cloth strips, plain cloth strips, or old suspenders (Fig. 10).

Plaiting.

One of the simplest, as well as one of the most important basketry technics of these tribes is plaiting, which is represented by a single variety, that of twilled plaiting with oblique elements only. The technic here is of equal rank with coiling, as one of the two most utilized, since articles of this construction enter largely into the economy of both the Papago and Pima households. It provides mats upon which to sleep, to eat, and to dry grains, beans, peppers, and other vegetables; headrings, for carrying the olla and the large basket bowl; the headband and back mat for the kiaha; cylindrical baskets for holding trinkets, clothing, and foodstuffs; and rectangular baskets for medicine and magic to drive away the evil spirits.

Mattings from peoples of lower culture in different parts of the world vary in technic, but the most common construction is that of plaiting, either with vertical and horizontal elements, or with oblique elements. Pima and Papago matting, as before mentioned, is of twilled plaiting of the oblique variety, constructed of two series of parallel strips crossing each other at right angles. The strips of both series are of equal width and pliability, and contrary to the weaving technic, both series of elements are active, moving over and under each other with equal ease. Neither is there a definite direction to the technic, as in weaving and coiling, since the elements can plait in any, or in all of the four directions, which the worker may desire. The movement on most of these mattings is in one rhythm or count throughout, each element passing with one move over three and under three elements of the opposite series, with an advance of one element as each new leaf strip is added. The rhythm on the old Pima matting seen in Fig. 12, is an over two under two movement, while other less common arrangements may be noted under matting designs.

Palmea (*Dasylirion Wheeleri*) is the plant from the rocky foothills which supplies the Papago material for plaiting. Its growth is similar to the Spanish bayonet, with long light green thorny-edged leaves arranged about a thick central stem. The leaf of the palmea is the useful part of the plant for plaiting, and is in perfect condition to be gathered at any time of the year. Its harsh spiny edge makes it difficult to collect, necessitating the use of a stick for breaking off the leaf; so that for the gathering, the women travel afoot armed with long sticks for severing the leaves. When a sufficient number has been secured, they are carried home in bundles on the head, or in the kiaha carrying frame on the back. On reaching their destination, the leaves are first cleared of their thorns with a knife, and then split lengthwise through the center, and spread on the ground to dry.

Fig. 11 (50.1–5232). Papago Eating Mat. Two-ply twilled plaiting with a design found only on eating mats and never on sleeping mats.

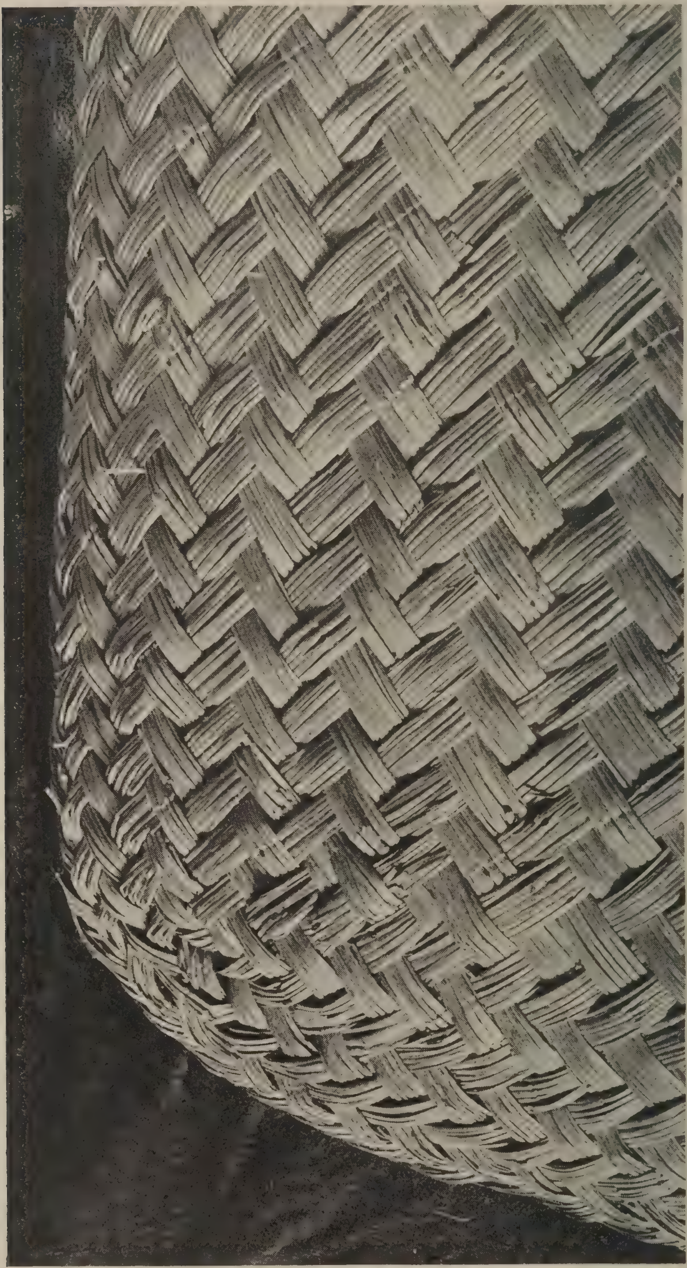


Fig. 12 (50.1–5315). Pima Mat. A rare old specimen since the river grass of which it is plated no longer grows along the streams.

When needed for plaiting, the dried leaf strips are first buried in a hole in the ground, water poured over them, and then left in the damp earth through the night. By morning, the strips have become slightly dampened throughout and are pliable enough to plait without cracking.

The cane, *Phragmetis communis*, was the river plant which served the

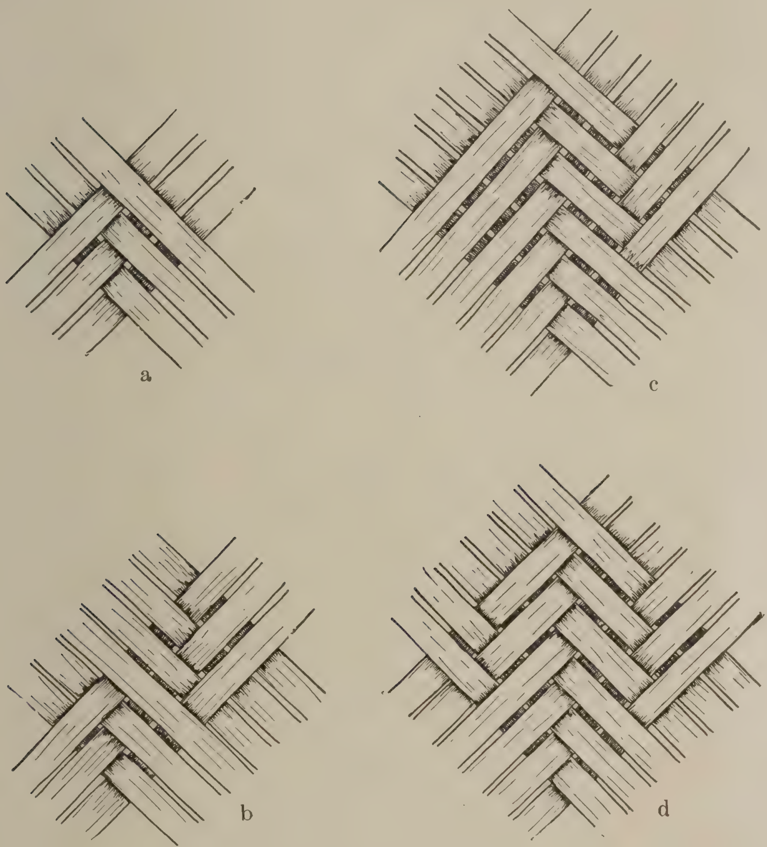


Fig. 13. Method of Mat Plaiting.

Pima for plaiting in times past before the headwaters of their streams were diverted, and the rivers deprived of water. In consequence, *Phragmetis* no longer grows along the rivers, but in former times its hollow stem was found most valuable for the construction of mattings. These plants were cut down with large knives from land near the streams, carried home, and

the stems dried and stored away for future use, but before plaiting the hollow stems were split lengthwise with the thumb nail, and then spread flat.

When the worker is ready to begin plaiting a mat, a few of the dampened leaf strips which have been moistened over night are brought from the pit, but only a few at one time since they dry rapidly in the open air. She then spreads a mat or a square of canvas on the ground upon which to work,

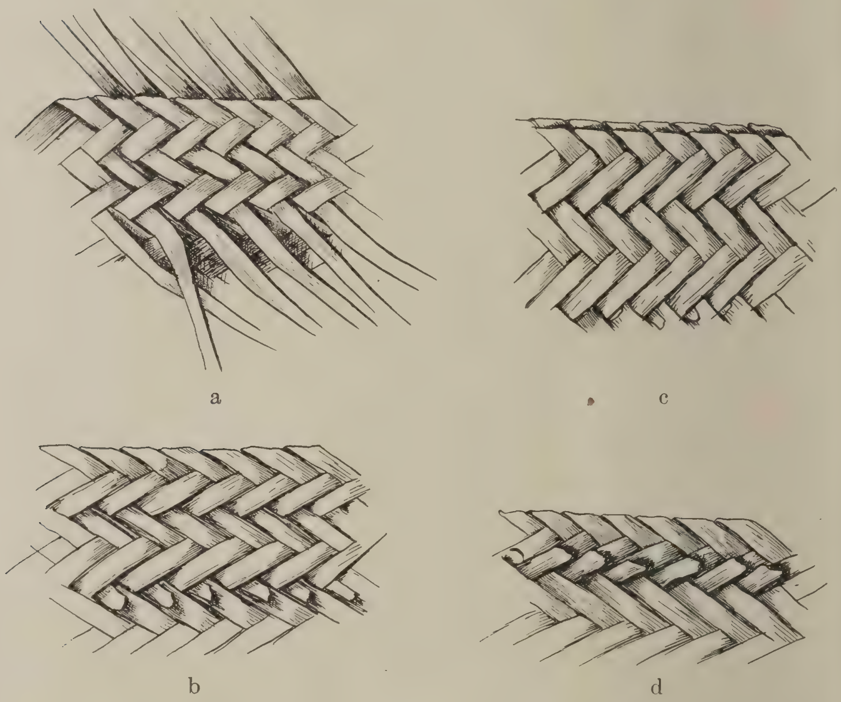


Fig. 14. Edge Making: *a*, beginning of a double edge; b, inside of completed double edge; *c*, outside of completed double edge; *d*, single edge.

and seats herself well to the edge with most of the mat in front of her. Upon this she lays her first six leaf strips in two parallel series of three strips each so that they cross each other at right angles. Each strip of the lower series is then brought up one after the other through the upper series in such a manner as to form three successive steps, as seen in Fig. 13a. The two groups of elements must be held in an oblique position to the worker throughout the plaiting, one series trending diagonally to the upper right, and the other diagonally toward the upper left. She adds new strips only to the

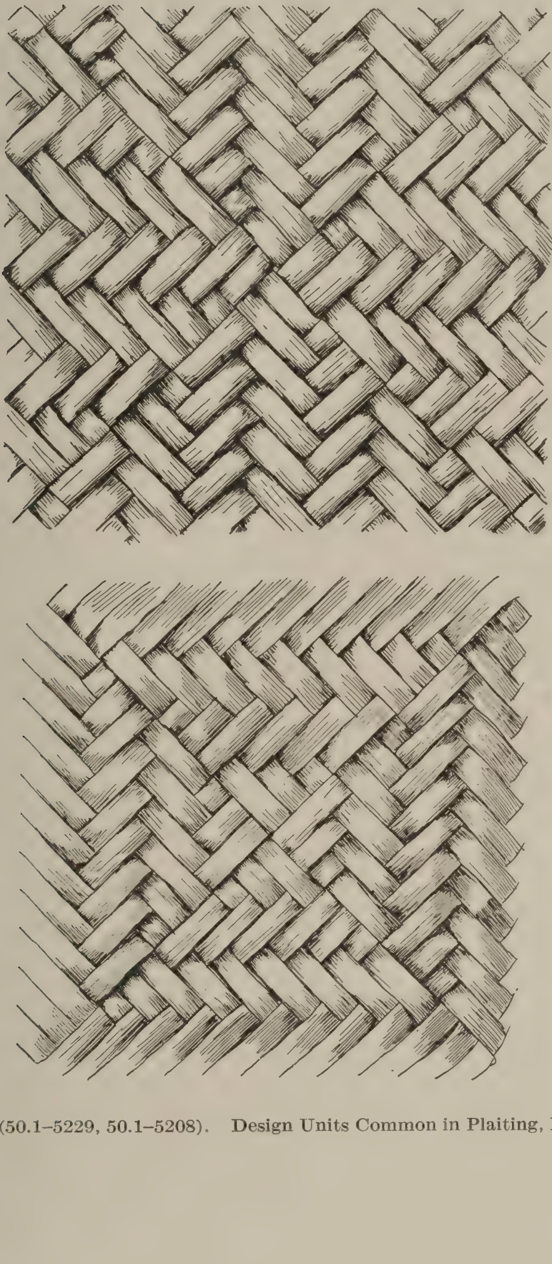


Fig. 15 (50.1–5229, 50.1–5208). Design Units Common in Plaiting, Papago.

farther or upper sides of the mat that they may be more easily crowded toward her for a closely fitting surface, and when more are needed on the near side, she turns the mat around bringing the far sides nearest her, but in every case the elements remain in an oblique position. Three new strips are always added at one time, as in the illustration here, where the first three are laid to the upper right and then plaited in the manner already described (Fig. 13a), by being brought up through the series already in use, to continue the step series already begun (Fig. 13b). Another group of three strips is added to the upper left and so placed as to hold to the plan (Fig. 13c), when they are plaited according to the regular rhythm (Fig. 13d). So the process continues as each set of three strands is added, when the three are plaited in. When splicing is necessary to lengthen a strand, a new strip is lapped for a few inches over the old strand; and when the inconvenience of reaching the spot where the plaiting is in process is experienced, as the mat grows larger, the worker moves on to the finished portion, and continues plaiting from there.

When the mat has reached the proposed size, it may be finished with either of two edges. The double edge is most common on mattings, and is made by bending one series of parallel elements to the front and downward and interplaiting them into the body plaiting on the front of the mat, and turning the second series to the back and downward and interplaiting them into the body plaiting on the back of the mat. More definitely, each element of the series trending toward the upper right is bent at the edge of the plaiting to the front, and turned obliquely to the lower right, at an angle of ninety degrees, and then interplaited for a short distance into the body plaiting (Fig. 14a), and trimmed off (Fig. 14b). The mat is then turned over, when the second series which trended toward the upper left, now extends toward the upper right. These are bent and interplaited as were the elements of the first series (Fig. 14a), making the finished double edge (Fig. 14c). If during interplaiting, the elements do not slip easily into the plaiting, a sharp stick is used to lift the strands, that those forming the edge may pass under more easily. The single edge is less frequent on mattings than the double. It is made by treating the first series of elements as in double edge making (Fig. 14a, b), and then clipping the second series of elements short at the edge of the mat (Fig. 14d).

Design on twill plaiting is more largely influenced by technic than is the design on any other style of basketry. In its simplest varieties, such as are found here, the design appears to be a result of a play with the material, and this play resolves itself into several rhythmic arrangements. As before mentioned, the regular movement of the technic over three and under three, or over two and under two, is a result of the most economic use of

palmea leaf strips and cane stems; but this movement is also of esthetic value as it cuts the surface of the matting into small equal sized rectangular units of design. Different arrangements of these design units give three distinct styles of pattern: an arrangement of parallel bands running in one direction Fig. 12; another of parallel bands perpendicular to each other, part horizontal and part vertical (Fig. 15a); and still a third of parallel bands arranged in squares, a large square composed of smaller graduated squares (Fig. 15b). The grouping of these larger squares is always a vertical or a horizontal one, forming a pattern of squares one above the other, or beside the other.

In addition to the influence of technic on matting design, there is still another, the influence of material. Matting materials in this locality are not strong enough to be serviceable in narrow strips, and wide strips of necessity produce a plaiting which does not admit of many changes in rhythm without weakening the matting. More elaborate twillings, such as those found in the land of the bamboo, are constructed of material which is tough enough to be used in very narrow strands, capable of spanning long stretches of a number of opposing elements, as well as a few, and so allow for great variety in design on a plaiting which also is strong.

Fewer mats are now found on the dirt floors of the one-room Pima hut than formerly, as old customs are fast dying out. The Papago homes, however, are still plentifully furnished with plaited mats of the light green palmea, which turns to a yellowish green with age. At times, the floor is completely covered with them, especially if the family is large, but two or three are quite sufficient for the floor space of the average hut. More frequently one mat only is used, and that is placed either in a corner, or at one end of the hut. These serve mostly as sleeping mats, upon which the blankets are laid at night to lift the sleeper from the dirt floor. In the neater homes, the blankets are folded through the day, thus leaving the mats free as a place to sit. In other huts, the mats are not left on the floor during the day, but rolled up and stood on end in the corner, ready to be unrolled and spread with the blankets when night approaches. The primary use of these mats is for sleeping, but smaller ones are utilized for eating mats (Fig. 11), as is easily recognized by the food spots which stain them. Eating mats serve another purpose during the season for drying foodstuffs, when peppers, beans, corn, or wheat are spread upon them to dry in the sunshine, although the modern square of sacking is at times substituted for this.

In shape, the mats of both tribes are rectangular, either oblong, or square, with rounding corners. The more general oblong form is varied in its proportions to fit the need, but the width is seldom less than half the length. Within some Papago households more than in others, an atmos-

phere of abundance pervades, when the mats take on larger dimensions, even reaching 2.4 m. by 1.3 m. and 2 m. by 1.7 m.; although 1.8 m. by 1.3 m. for the sleeping mat, and 1 m. by 1 m. for the eating mat are more usual sizes.

An additional matting to those which serve for sleeping and eating is the small back mat made for the kiaha carrying frame. This protects the head and shoulders from the heavy load during transportation (Fig. 80a), as it is attached to the front of the kiaha and comes between the woman's back and her load. Its upper corners are tied to the wooden rim of the kiaha, its lower end is secured by the two long poles of the framework, which pass through an opening near the edge. Just above this opening is the spot where the lower ends of the four poles of the kiaha framework cross, making an ugly bunch, which would prove very uncomfortable to the carrier, were it not for the back mat, and the roll of shredded bark, or cloth, slipped in at this point to serve as a padding between the mat and the frame. This padding lifts from the back the hard poles of the frame at their point of crossing, where the load rests most heavily upon the shoulders.

These mats are oblong in shape with oval corners, and have a break, or opening, near the lower edge for the insertion of the two front frame poles which extend some distance below the point of the kiaha. The size of the mat varies in woman's and girl's kiahas to fit the larger and smaller shapes, that of the woman averaging from 60 cm. to 70 cm. in length and from 24 cm. to 28 cm. in width, since it must fit in length, the distance between the rim of the kiaha and its point; and in width, the space between the two poles half way down from the rim, or the point where the headband is attached. The material for the back mat, like that for matting, is the dried leaf strips of the palmea, whose gathering and preparation was previously described. The technic is plaiting of the twilled type, with diagonal elements, and as in larger mattings it is of three varieties of twilled plaiting in over three and under three rhythm, arranged in bands of vertical parallels; in combined bands of vertical and horizontal parallels; and in squares composed of smaller squares. The edge like that on large mattings is of the double type, whose method of making has already been given.

Plaiting supplies the kiaha with another essential part, the headband, or the support for the carrying basket. This is a narrow double band which passes over the head to hold the load securely on the back and shoulders of the carrier. In reality, it is a long narrow mat with its ends joined to form a ring, and then flattened into a double band about 7 cm. wide and 35 cm. long. It is very short, but a rope extension lengthens it, and attaches it to the kiaha at its two ends by passing in a double line under the front poles of the kiaha frame, then down and around the four crossed poles below the kiaha point. The process of making the headband will be described later.

Aside from flat mattings the Papago plait cylindrical and rectangular forms, one of which is the circular headring, Nothing is more helpful to the Indian woman for carrying loads on the head than this small ring about 4 cm. or 5 cm. in diameter, since she must bring from the village well all the water for washing, cooking, and drinking; from the neighboring fields, grains, beans, peppers, squashes, and other vegetables; and from the distant foothills the favorite cactus fruit. She carries these at times in the kiaha on her back, but quite frequently on the head, the water in an earthen olla, or the more modern rectangular three gallon varnish can, and the foodstuffs in a basket bowl. When carrying these loads, she places the little headring on the crown of the head, and the load on top of it, for it acts as a soft pad between the load and the head, and also steadies the basket, or olla, if it have a curved base. A woman so laden is a pretty sight as she steps along with easy gait and erect carriage, balancing, without the aid of her hands, the great weight upon her well-poised head, for it is this practice of transporting burdens upon the head which has given her that grace of bearing which well befits a queen.

The basket headring, like matting, is a twilled plaiting of palmea (*Dasylerion Wheeleri*) leaf strips, but the rhythm of the plaiting never varies from a regular over two and under two movement. Its beginning is a small mat made on the ground with two series of equal width leaf strips placed diagonally in front of the worker. In starting the headring the two series of three strips each, are laid so as to cross each other at right angles near their central point, when the three strips of the lower series are brought up through the upper series as in beginning the sleeping mat (Fig. 16a). The next move in ring plaiting, however, does not proceed as in mat making, for at this stage the edge finish is begun. For this, the upper end of the lower left-hand strip is bent toward the upper right at an angle of ninety degrees and lies just above the upper left-hand strip (Fig. 16b). Three new elements are then added on the upper right, and so placed as to hold to the regular step series of the beginning (Fig. 16c). These are then plaited in regular rhythm, over two and under two (Fig. 16d), when the three are bent to the upper right at an angle of ninety degrees and plaited into the opposing strips (Fig. 16e). This process continues until the finished edge of the mat is the length of the proposed circumference of the completed ring.

When the little mat has reached this stage (Fig. 17), the woman lifts it into her lap and bends it into ring shape, so that the loose ends at the right and left of the finished edge come together. These ends are then plaited to form a cylindrical shape (Fig. 18). The plaiting then continues upward until the cylinder is about three times the proposed height of the finished ring, when each strip of the series of elements trending toward the upper right

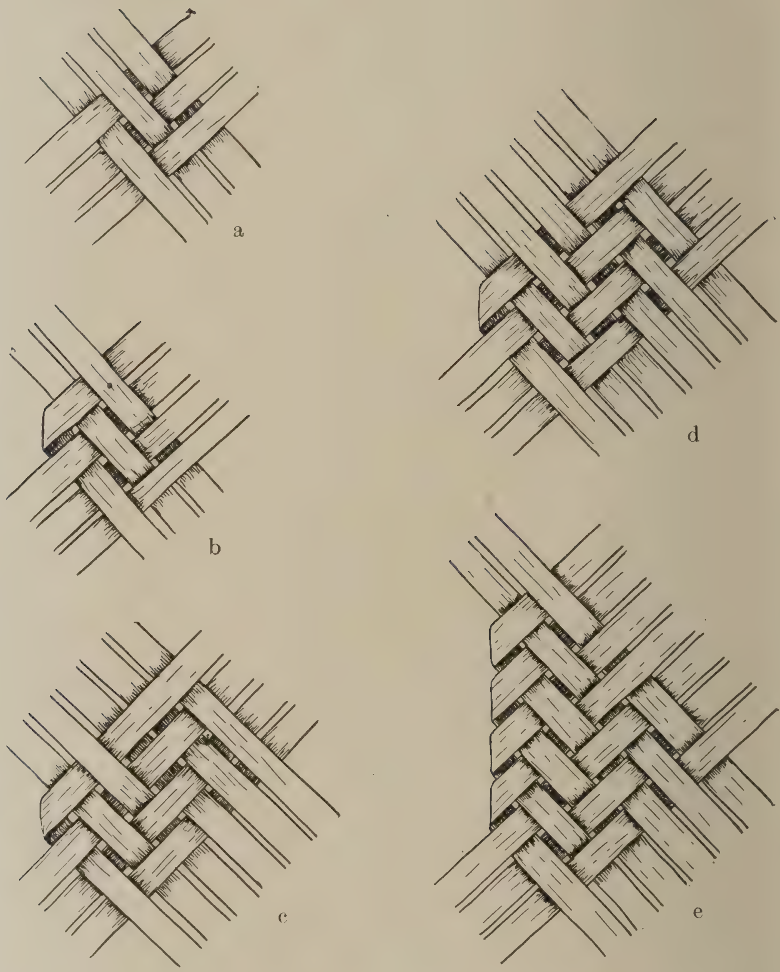


Fig. 16. Method of Plaiting the Headring.

Fig. 17 (50.1–5147). Plaited Beginning of Headring ready to shape into Cylindrical Form.

Fig. 18 (50.1–5224). Further Plaiting on Cylindrical Form.

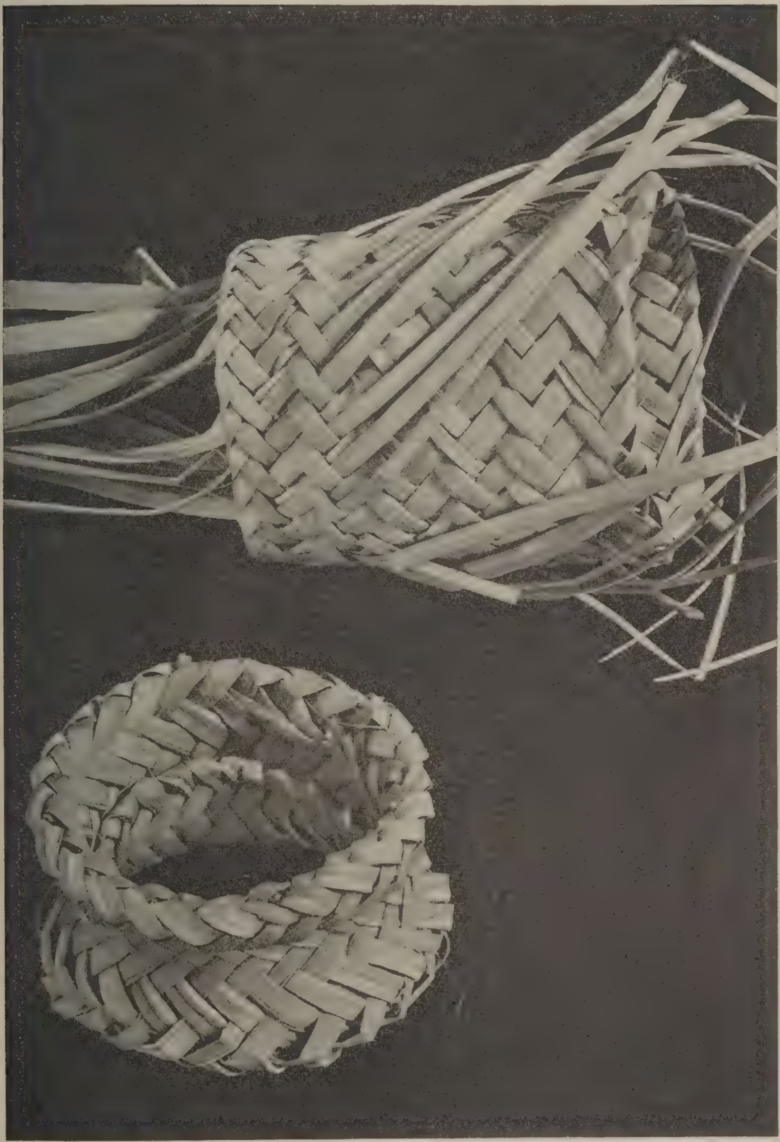


Fig. 19 (50.1–5225, 5226). *a*, Cylindrical Form completed, ready for trimming off Ends; *b*, Completed Headring made by folding the Cylindrical Form.

is bent at right angles and plaited into the body plaiting (Fig. 19a, Fig. 14a) and then trimmed off (Fig. 14b); while the second series of elements, those trending toward the upper left, are cut short at the upper edge (Fig. 14d). The work is still damp enough to fold without cracking into the finished ring, which is done by creasing the tall cylindrical shape into three overlapping folds. A thin leaf strip is then either tied about the middle of the ring or bound about its edges to hold it in shape when heavy loads are carried (Fig. 19b).

The material for making the kiaha headband, already mentioned, is palmea (*Dasylerion Wheeleri*), the usual plaiting material of the Papago; the technic employed is twilled plaiting in rhythm of over two and under two. It is begun as the headring (Fig. 16), but with nine or ten strips only, since this number is sufficient for the narrow width of the band, as they are bent back and forth, in plaiting from edge to edge (Fig. 20). More definitely, after completing the interlacing, as in making the headring, the plaiting continues toward the right until the desired width is attained. Each strip trending toward the upper right is then bent toward the upper left at an angle of ninety degrees, thus forming an edge on the right, similar to the edge on the left, for like a braid, the two edges are finished with the plaiting of the strips diagonally back and forth across the band as the work progresses. When it has reached twice the proposed length of the finished band, its ends are brought together in ring shape and joined by interplaiting as in the headring (Fig. 18). This ring folded flat is the completed headband, which is attached to the kiaha, as above described.

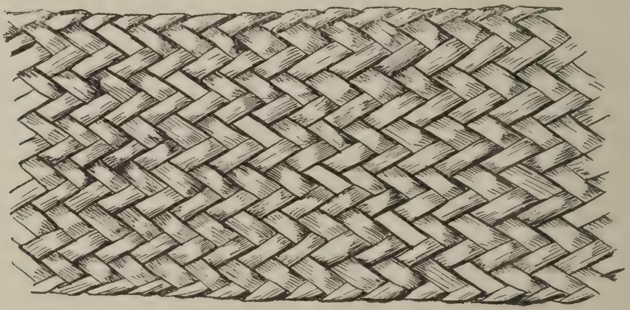


Fig. 20 (50.1–5230). Detail of Kiaha Headband.

Cylindrical and rectangular basket shapes are also plaited by the Papago, although for light use only, since they are not particularly substantial. Palmea leaf strips make a basket of more or less irregularity of outline and one so quickly and easily plaited that it is not so highly prized as is the more

perfect and laboriously made coiled ware. Plaited baskets serve two functions, both utilitarian: one, to meet a domestic need in general household affairs; the second, to serve as a case to enclose ceremonial objects. Household baskets contain trinkets, sewing articles, clothing, grain, fine seeds, and various odds and ends; ceremonial baskets enclose the numerous medicines of the medicineman or woman, for doctoring the sick and regulating the weather, besides holding the little bags of paint employed in decorating the face and body at ceremonial dances.

The two distinct uses of plaited baskets call for special shapes to fit the dissimilarity in contents, so that baskets for household use are cylindrical in form on a square base, with at times a square-topped overlapping cover (Fig. 21). Although in general outline the baskets hold to the cylindrical form, they often vary slightly from the true cylinder by a gradual drawing in towards the rim (Fig. 21), or this contraction may be followed by an outward curve at the immediate edge (Figs. 22 and 24). The shapes vary considerably in proportion as some are of greater width than height, others of greater height than width, and still others are of equal proportion (Fig. 21). The sizes also cover quite a range, as the dimensions vary from 11 cm. to 40 cm.

The technic is twill plaiting in the rhythm of over three under three, and so constructed as to form parallel bands arranged horizontally, vertically, and in graduated squares (see matting design). The bases are of two styles: (a) the more usual, broken by parallel lines of equal width arranged in graduated squares (Figs. 15b and 23); and (b) the less common cut through the center by a vertical cross (Figs. 15a and 24). The walls of the baskets with base (a) are so constructed that the plaiting results in parallel bands arranged horizontally encircling the basket (Figs. 22); while those with base (b) are so plaited as to result in parallel bands running vertically, although often these vertical bands do not extend to the rim of the basket, but are broken by horizontal lines (Fig. 21). When the base is completed and the wall is to be begun, no additional strips are added, but instead the adjacent strips at each corner are drawn close together and plaited into each other (Fig. 25). The basket edges are all single, as described under mattings. An extra bit of ornament is occasionally constructed with the edge elements, as in Fig. 24, which after having been plaited into the body plaiting are not cut short, as is the usual custom, but turned diagonally toward the upper left and caught under the plaiting.

For ceremonial purposes, the Papago make use of the trunk-shaped basket with a deep overlapping cover, for in this little trunk they place the medicines, paints, etc. It is made particularly for this function, and all the medicine baskets seen on the expedition had been made by the wives,

Fig. 21 (50.1–5278). Plaited Basket with Cover, Pima.

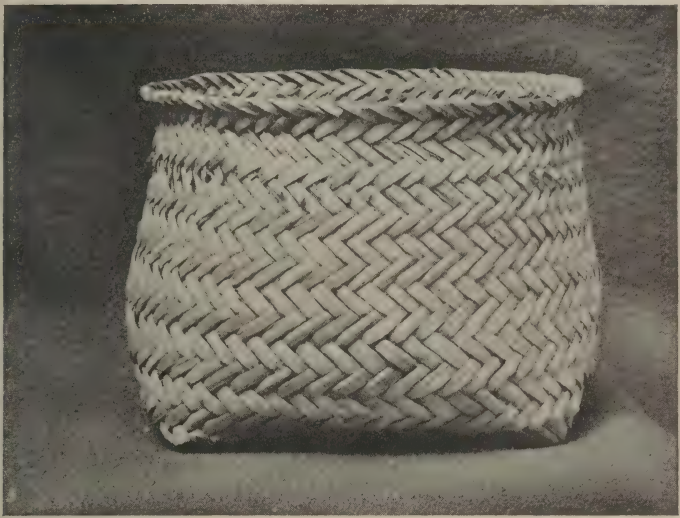


Fig. 22 (50.1–5118). Open Plaited Basket, Papago.

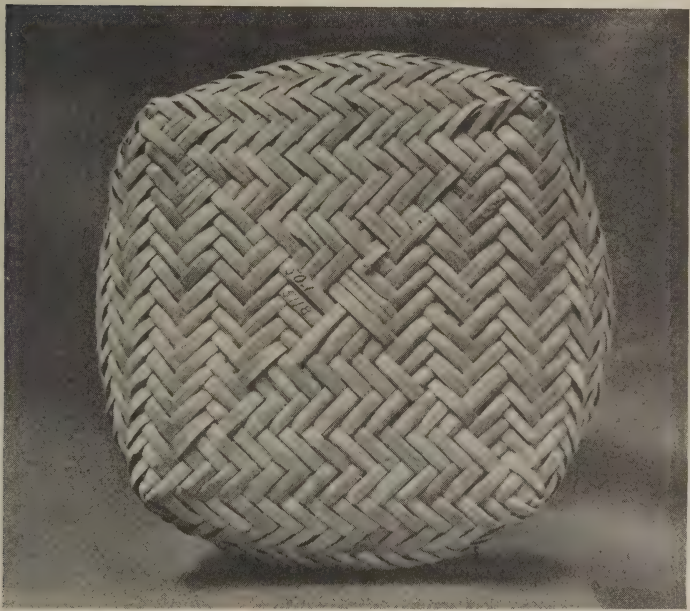


Fig. 23 (50.1–5118). Base of Open Plaited Basket shown in Fig. 22.

Fig. 24 (50.1–5229). Open Plaited Basket and Base, Papago.

or the mothers of the medicinemen; or by the medicine women themselves. Information was not obtained as to whether other people were allowed to make them, or whether the construction was conducted under different conditions than those during the making of an ordinary household basket. From the oblong base are erected vertical walls for the body; while from a slightly larger oblong top are dropped vertical walls about two-thirds the height of the basket, for a cover. This ample overlapping cover is usually tightly tied on with a string about the center, which tends to give a sag to the middle after short use (Fig. 26). These trunks vary in proportion, some are long and slender, others are short and broad, but their ends in most cases approximate a square. The sizes run from 13 cm. to 86 cm. in length; 7 cm. to 15 cm. in height; and 4 cm. to 21 cm. in depth.

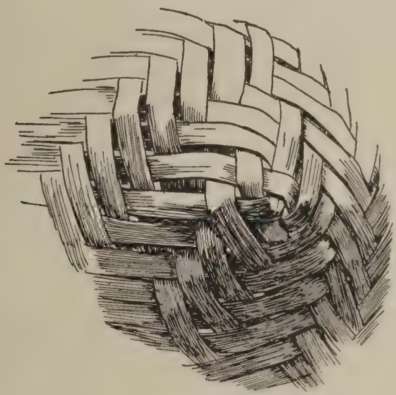


Fig. 25 (50.1–5228). Method of Plaiting Basket Corner.

The technic of the base is twilled plaiting in parallel bands of over three and under three rhythm; the walls are in encircling horizontal bands of the same rhythm; and the cover is like the body of the basket turned upside down. Very occasionally the base and the top of the cover are so plaited as to form two or three squares placed side by side, each enclosing smaller graduated forms of the same shape, such as that in Fig. 15b. The manipulation of the strips to form the corners is the same as when making the corners of the cylindrical household basket, and the finish of the basket is the single edge.

The Museum secured on the expedition six medicine baskets belonging to medicinemen and women of four Papago villages. To these men and women are entrusted the welfare of each particular village, for the Papago believe in their supernatural power to disperse evil spirits which have entered

Fig. 26 (50.1–5165). Medicine Basket containing a Little Effigy used to prevent Attacks by the Apache.

into people and caused sickness, and into natural phenomena and caused disturbances; and also that aided by articles of magic, such as are found in these medicine baskets, together with proper ceremonials, the medicine-men and women have the power to avert all evils and invoke all prosperity.

A medicineman's rain-basket with its contents was obtained from the village of Covered Wells. In it are (a) turkey feathers which, with proper chants, bring rain; (b) three sticks of a long stemmed bush with stickers, such as cat's claw, each representing a year the medicineman has practised, and which, with prayer chants, cause rain and also cure rheumatism; (c) a stem of the shrub ash tree with an attached buzzard feather, for emergency cases when there is great need for rain and the preceding charms have proved ineffectual; (d) chicken-hawk feathers, which, when all previous attempts to produce rain have failed, serve as a desperate call for rain for the village, and water and food for the children; (e) deer tail, a cure for headache and also for fever; and (f) extra feathers.

A medicine woman's rain basket was obtained at Little Tucson, for although ceremonial curing is more generally practised by men, there are also medicine women. The contents include (a) feathers for painting the body on ceremonial occasions; (b) three rain-sticks, indicating the woman had been a medicine woman three years, and which with incantations and rhythmic beatings upon the basket drum give rain; (c) a stick with eagle feather, to call forth rain; (d) a tail for curing human illness; and (e) extra loose feathers.

Fig. 26 represents a medicine basket obtained from the medicineman at Santa Rosa village. It contains the magic to protect the Papago from the Apache whom they feared greatly: (a) a little Apache effigy with head of wax and body of string and eagle feathers; (b) a small skin bag with fringed edge, in which to encase the effigy when not in use; and (c) some additional loose feathers.

Another medicine basket was procured from the medicine woman of Little Tucson, from whom the rain basket described above was also obtained. The purpose of its medicine is for protecting an infant from being appropriated by evil spirits, for when (a) the bits of white clay, done up in the small cotton rag, are unwrapped, ground in (b) the shell, and given to the infant, the evil spirits will flee. The powdered clay is administered when the child is about three days old, and at the same time some of it is given to the parents as well. This white clay is also dispensed to young girls as efficacious in protecting them and dispersing all evil spirits. Within the basket is another very small empty one, with no other significance than that it was the first medicine basket this medicine woman made.

A medicineman's basket from San Xavier contains a turtle shell, which

has been converted into a rattle. The magic of this charm had served three generations of medicinemen, for it had been used by the grandfather, and in turn the father of the medicineman from whom it was procured. The turtle had been secured by the grandfather, who cut off its head and legs, and left the shell for ants to clear, before converting it into a rattle. Its efficacy lies in its power over sickness caused by the turtle, such as rheumatism and diseases of old age.

A medicine basket also from San Xavier, although the basket, or the case for the medicine, was not made there but in Santa Rosa, contains owl feathers which have the mastery over certain secret forces in nature, more particularly in this case over sickness and distress due to the owl, the chief among which is fever.

Crude Coiling.

Another very simple technic found among the Pima is styled crude coil, since it is the crudest type of coiling in existence. Like all ware of this technic it is built spirally, and like foundation coil, it has a foundation element which is united into a solid structure. But the unique thing is that the customary two elements, a foundation and a uniting agent, which are the usual components of foundation coiling, are here merged in one element which performs the work of both. This single member acts as a solid foundation spiral, and also unites its own adjacent segments (Fig. 27). The constituent parts of this one element are twigs of some size, which are added singly and in their natural state still bearing smaller twigs and leaves. The two ends of the twig accomplish the uniting, or binding process, for their stem end clutches into the foundation of the last round of coiling, and the slender leaf end secures itself by winding about the previous twig. A stem end is first inserted on the outside of the previous segment of coiling, and a second stem end is thrust in on the inside a short distance beyond where the first twig entered the previous coil. The continuation of this simple process of inserting one stem on the outside, and the next on the inside, and in each instance winding the leaf end about the previous twig completes this one-element coiled technic.

Besides disagreeing with other coiling of these people in the number of elements which it employs, crude coil also differs in the direction of the movement of the technic. Coiling with two elements advances from right to left, or in a counter-clockwise direction. This would be awkward in crude coiling so we find the technic moving from left to right, or clockwise, as is natural with people who are right-handed. The left hand holds securely the work already completed while the right is free to do the in-

serting of the stem ends and the winding of the leaf ends (Fig. 27). Simple as is the process of constructing crude coil, far from simple is the appearance of the finished technic. One can easily see by Fig. 28, how completely obliterated in a crude mass of twig stems is the actual process. Solving the enigma of its construction from the complicated surface of the finished technic is impossible, for when the leaves have dried and dropped, the tangle of woody stems seem to have grown into this mass. Only after watching an Indian making the coil, or by tearing the technic apart, is its process discernible. So complex is its appearance that one ethnologist, in recording its existence among neighboring desert tribes, thus speaks of baskets constructed with this technic: "These granaries can be called baskets only by courtesy, as they show no distinct weave." [1] Dr. Barrows, however, has looked deeper into its construction in baskets from the Coahuilla, and calls it "a coiled technic of twisted osier withes." [2]

Granaries of crude coiling seem to have had quite a distribution along the streams of this desert quarter before white men disturbed the culture of the red men. They have been found in the cliff-dwelling caves of southwestern Colorado, and are used today upon the roof by the Pima and Cocopa,[3] upon platforms by the Pima and Mohave,[4] Coahuilla [3]; and upon the ground by the Papago, in the few instances found. The forms of these granaries vary but slightly, except in the hive shapes of the Papago, since they hold to the cylindrical as with the Mohave; or to the cylindrical with a spreading toward the base as with the Coahuilla; or to the cylindrical with a spreading toward the top as with the Pima.

These great nest-shaped structures, roofed with overhanging twigs, perched upon many of the hut roofs are a novel sight to the traveler as he enters a Pima village (Fig. 29b), although very occasionally as already said, they are on raised platforms (Fig. 30). These structures, not only resemble a huge nest in form, but also in texture, for they seem put together much as a bird builds a nest; in reality they are immense baskets, termed caches, and constructed of the coiling previously described, the crudest coiled basketry now known. They are baskets for storage, for the preservation of the crops of wheat and corn, as well as mesquite beans in the pod. To reach the granaries on the roof a ladder must be used, and it stands ready at all times against the wall of the hut. The women must climb this ladder each time the family needs a fresh supply of grain or beans and also in time of harvest,

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1 Kroeber, A. L., "Ethnography of the Coahuilla Indians," *University of California Pub.*, Vol. 8, No. 2, June 1908, 42, 43.

2 "Ethno-Botany of the Coahuilla Indians of Southern California," *University of Chicago Press*, Chicago, 1900, 52, 53.

3 Barrows, *ibid.*, 52, 53.

4 Kroeber, *ibid.*, 42, 43.

Fig. 27. Technic of Crude Coil.

Fig. 28. Papago Granary of Crude Coiling, (United States National Museum photograph).

a

b

Fig. 29. *a* Old-time Ladder for filling Pima Granary on House Top; *b*, Storage House with Two Granaries and Modern Ladder.

when the winter's supply is hoisted to these granaries for storage upon the hut roof. Present-day ladders have the two upright beams of small cottonwood trunks, with rounds, or slats, of cactus rib, (Fig. 29b). Old ladders, numerous throughout the Southwest in years gone by, but seldom met with now, are of a large cottonwood tree trunk, notched for steps (Fig. 29a).

For making this rustic technic, the Pima and Papago find growing along the few streams of their arid land the slender, pliable, but not very durable arrowbush, *Plucea borealis*. Its stems in olden days furnished the wood for

Fig. 30. Granaries on Platforms.

arrows, and at the present time builds the hut of the Pima as well as this basket granary of crude coiling. For this purpose the stem of the arrowbush is broken near the ground and used immediately while still fresh and pliant. Since that section of Papagueria which is in Arizona has but one river, arrowbush is not as plentiful as with the Pima, so crude coil is very little practised, and when it is, another similar material, likewise termed "shamt" is frequently employed. For the same technic the Coahuilla use willow,[1] the Mohave arrowbush.[2]

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[1] Barrows, *ibid.*, 52.

[2] Pacific railroad survey itinerary, p. 115.

The Pima storage bin is built without a base for the roof, or platform, upon which it rests usually serves this purpose, although a layer of arrowbush is frequently spread on the spot where it is to stand. The granary is covered with a roof, slightly raised in low cone shape at the center and gently sloping to the overhanging rim. Like the body, its roof is of arrowbush twigs, but so placed as to radiate from the center, and these are laid upon a square of cloth, or a piece of old grain basket of coarse coiling, to keep the contents free from dropping leaves of the arrowbush, and the dirt which is piled loosely on top of the granary cover. Granaries vary considerably in size, but the average height is from 40 cm. to 50 cm., and the diameter about 1 m.

The Pima nest-shaped storage basket is not used by the Papago. The very few granaries of crude coiling made by them are shaped like a hive, or a barrel with incurving top (Fig. 28). Its base is usually a coiling of finer material: willow, cottonwood, or more frequently beargrass, since arrowbush is too stiff a material to work into the close rounds of the circular base. The Papago barrel-shaped bin is never found on the hut roof, but stands on a few boards, or stones, to lift it from the ground; neither is it roofed over, but its opening is covered with an old tray basket, or a piece of canvas. At times, it reaches the height of a man's shoulder, but more usually is slightly lower. As these baskets for storage are always found out-of-doors, and never within the hut or the storage shed, they must weather the climate, which in this region, however, is not a severe one except for heat, wind, and dirt. Even with these conditions some granaries will last two years, but it seems a more frequent custom to construct a new one each twelve months, and this is not a laborious task as one can be easily made in a day.

For constructing crude coil, no tools are required further than something for cutting down the material. As before stated, the Pima granary is without base, so that the first coil of the wall will be the beginning of the granary. This is started by making a bundle of twigs about half the size of a man's wrist into a ring, with a diameter equal to that of the proposed base. The bunch of twigs forming the ring are bound over and over with a slender twig, for to this ring will be attached the first row of coiling, since into it the stem ends of the twigs are inserted. First the stem end of a twig is thrust into the outside of the ring in such a manner that the stem will follow the top edge of the ring, with its leaf end pointing toward the right. The stem end of a second twig is then thrust into the ring on the inside about two inches to the right of where the first stem end entered the beginning ring, with its leaf end pointing to the right as before, when it is wrapped about the first twig. The stem end of a third twig is then thrust on the outside of the beginning ring, two inches to the right of the point where

the second twig entered the beginning ring. The leaf end of this twig points to the right, and wraps about the first and second twigs which by this time make a coil of some size. The stem end of the fourth twig is pushed into the beginning ring on the inside and its leaf end wrapped about the previously twisted twigs (Fig. 27). So the process continues until there remains no more space on the beginning ring for the insertion of more twig ends, when the first row of coiling just completed must serve as a ring for the insertion of new twigs. The stem ends are pushed into this as before, alternating first one on the outside and then another on the inside; and this continues round after round, until the granary wall has reached the proposed height, when as a finish the last leaf end is bound with a twig, or string, to the previous row of coiling.

Coarse Coiling.

A great step in advance over the last unique coiling of one element with a double function, is another more general type of foundation coil which is practised by both Papago and Pima. It is a coarse coil with two members: a foundation element, or passive spiral; and a binding element, or active spiral which unites the segments of the passive foundation (Figs. 31 to 33).

The direction in the movement of the technic, that of the foundation and its accompanying binder, differs from crude coil, since it moves toward the left, or counter-clockwise. This is the natural movement for coiling of two elements with multiple foundation, for right-handed people, since the left hand supplies fresh material for the foundation, and also holds it in place while the right manipulates the binding element by passing it toward the left over the already prepared foundation. Both tribes work baskets from the outside, as well as from the inside, depending entirely upon which surface they wish to give the smoother finish, so that before determining the direction of a technic it is necessary to find the right side of the technic.

In addition to the general movement of both foundation and binder in the large spiral about the basket, the binding element has a secondary movement which unites the adjacent rounds of the technic by means of a smaller spiral. This smaller secondary spiral moves about the foundation coil in process and punctures the upper edge of the foundation coil in the previous round, binding the round in process securely to it. The style of this smaller spiral designates the particular type of coiling, which in this case is a plain spiral and not twisted, interlaced, or looped as in other types; so the technic is termed spiral coiling (Figs. 31–35). The segments of the

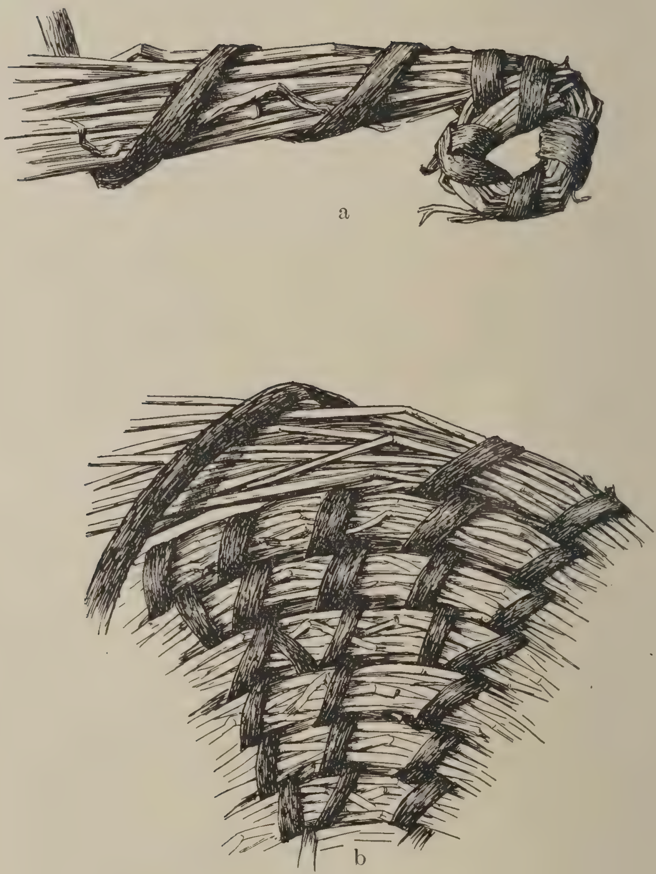


Fig. 31 (50.1–5274, 5275). Coarse Coiling, Pima: *a*, beginning; *b*, base.

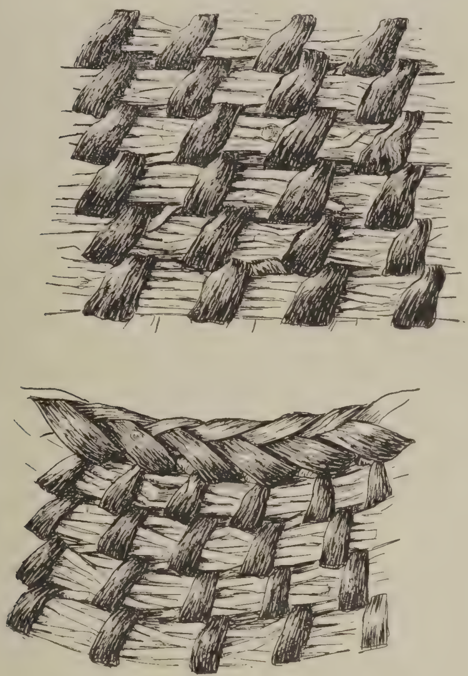


Fig. 32 (50.1–5276). Pima Coarse Coiling showing Side Wall and Edge.

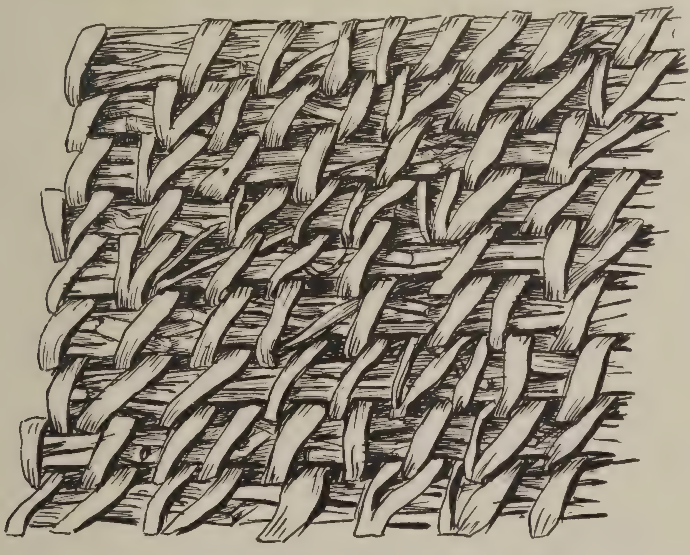


Fig. 33 (50.1–5192a). Papago Coarse Coiling.

binder are not placed in juxtaposition to each other in this coarse coil, but are spread apart in a distended spiral, thus allowing the foundation to show between, and resulting in a more open texture than that of smaller baskets, which are constructed of finer materials, and for this reason it is commonly termed "open coiling." In coiled basketry the foundation element may also show a diversity in composition, which, however, is of minor significance as belonging to an inner member and so receives the last consideration. Here it is composed of a number of splints and in consequence is called "multiple foundation" (Figs. 31–35).

Coarse coil constructs a second style of granary, but one which is not found on the house roofs and outside platforms, as are the nest and barrel shapes of crude coiling, for this storage bin is not exposed to the weather but kept indoors; when families are poor, it is placed in a corner of the hut, but if they are more prosperous, it is housed in the storage shed. Like the crude granary, it stores wheat and corn, and in addition may hold fine seeds, and shelled beans of several varieties. The Indians are loath to part with either of their storage baskets, for within them much of the family food supply is deposited, when nature has ceased for a season to yield the fresh foods (Figs. 30, 35). If the year has not been an exceptionally dry one, a Papago or Pima storage shed after the harvest season has past is an enviable sight. On its walls are basket materials, martynia, willow bark, willow splints; standing in a corner are beargrass, cat-tail, wheat straw; from beam to beam hang peppers, red and green; while on the ground are squashes, gourds, and great basket granaries full and running over with grains, beans, and various seeds. All these assure comfort to the family during the season when nothing is supplied by the fields. The preservation of the smaller foods required suitable receptacles, and these coiled granaries have supplied this need and so are greatly prized.

In outward appearance this second storage bin differs greatly from the crude type with its loose ragged structure described above, for here the walls are more substantially built. Just how long it will last before falling to pieces, depends upon the place it is kept, the care it receives during use, and the excellence in workmanship when constructed. Some storehouses are crudely built, open to the dust and dirt blown in by desert winds; some Indians are heedless in handling and filling their storage baskets, and others careless in the compactness of its construction, for at times the binding element is loosely coiled, with great spaces left between the segments of the binding spiral. However, the bin commonly has enduring resistance for about eight or ten years of continuous service.

This is not an uncommon storage basket among peoples of lower culture. Similar baskets, both in shape and technic, are found in many parts of Africa

and a number of localities in America. The largest bins of the Papago and the Pima correspond in being globular in form; but the smaller bins differ, as the Pima are bell-shaped, with a flat base and obliquely straighter wall (Fig. 34), and the Papago barrel-shaped, with a smaller base and more rounding wall (Fig. 35). These bins are covered with a lid especially made for them, or with an old basket bottom of finer coiled ware. After they are filled these lids are sealed with mud; in fact, the whole bin may be completely covered.

There is great variety in the size of both Papago and Pima shapes, averaging from $\frac{1}{2}$ to $1\frac{1}{2}$ meters in height, but in the large spherical bins of both tribes they reach 2 meters in height and about the same diameter. These great globular granaries must be constructed within the hut or storage shed where they remain, since they are too bulky to pass through the door, or storage house opening after being made. They are also too large to be constructed by the usual method from the outside, but must be made from within, when the worker gets into the basket as seen in Fig. 39.

The materials for coarse coil differ in the two tribes: the Pima foundation is wheat straw (*Triticum vulge*); and the Papago beargrass (*Nolina erumpems*), wheat straw and ocatillo (*Fouquieria splendens*). The Pima binding materials are barks of the willow (*Salix nigra*), mesquite (*Prosopis veluntina*), *Acacia constricta*, and a few other trees; those of the Papago are leaves of sotol (*Yucca elata*) and mesquite bark. Wheat straw is procured from the fields after the harvest and needs no preparation. Beargrass is gathered from the foothills in summer, its method of collection and preparation are fully described in the chapter on close coil. Willow bark, mesquite bark, and other barks are stripped from the standing tree, and only a little is removed from each, that the loss of the bark may not injure the tree's growth. Bark must be used while still green, or if allowed to dry after cutting, it must be well soaked before it is pliable enough for use. Sotol is found on the upper mesas, its process of gathering and preparation will be found under close soil (p. 190).

Like all basket work of the Papago and Pima with the exception of cradle-making, these bins are constructed by the women; and as in all foundation coiling they are aided in their construction by two tools, a large butcher knife, or other strong blade, and an awl. This last is made of hard wood, either *Sarcobatus vermicularis*, or *Acaca constricta*, and whittled into shape by the women. The difference in general appearance of the Papago and Pima baskets of this type (Figs. 34–35), comes from two causes: a difference in material, and also one of care in setting the segments of the binding spiral (Figs. 32–33). The Papago foundation materials are rough and uneven, and equally so are the binding materials, while the Pima

foundation of wheat straw and the binder of willow bark are more manageable. This in addition to greater care in making, gives a Pima bin which is more perfect in outline, more solid in build, with the rounds of coiling more evenly and smoothly bound (Fig. 34, Figs. 31–32).

The coarse coiled granary is usually not made until emergency calls for it, when as the illustrations of a Pima at work show, the woman supplies this need. She selects a bunch of wheat straw about the size of a man's thumb, and wraps it with a strip of bark for about 4 inches (Fig. 36a), when

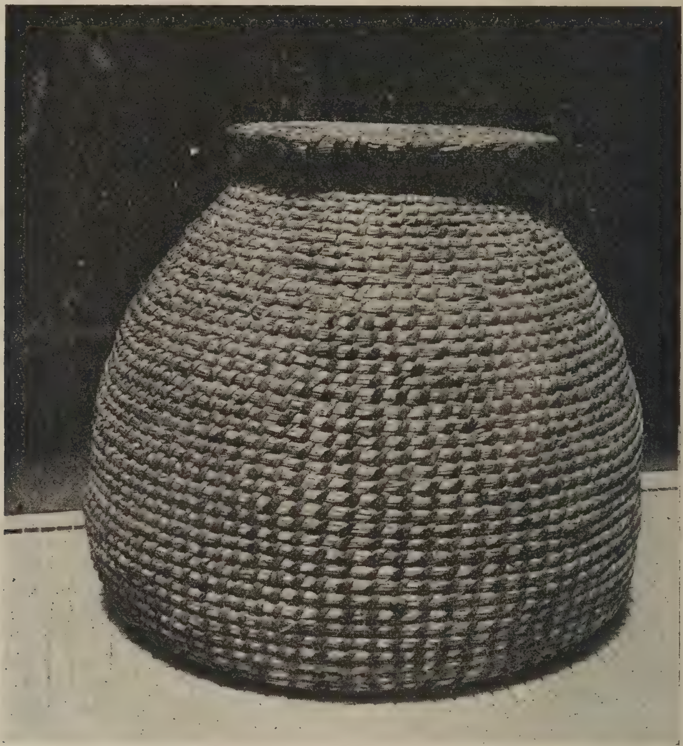


Fig. 34 (50.1–5276). Pima Granary of Coarse Coiling.

the wrapped bunch is bent to form a small ring, or circle, for the center of the base of the granary (Fig. 36b), and the binding element passed through the center of the circle a couple of times (Fig. 37a), to bind the ring securely (Figs. 31a, 37b). Regular coiling now begins by passing the foundation coil around and around this small circular beginning, while its accompanying binding element wraps about the round of foundation coil in process and

catches into the top edge of the coil below (Fig. 31b), through the hole already pierced by the wooden awl (Fig. 38ab).

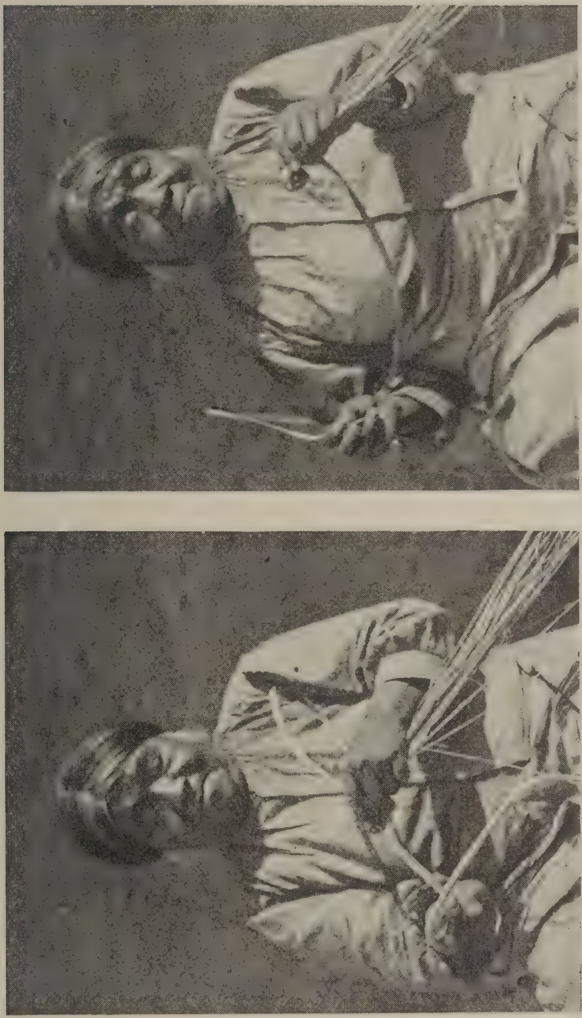
This continues until the base is the desired size, when the new round of coiling is so placed as to start the wall of the basket upward. The position of the new round of coiling in relation to the base, decides the prospective

Fig. 35 (50.1–5192). Papago Granary of Coarse Coiling.

curve of the wall, for in the setting of each new foundation round of the wall, lies the secret of shaping the outline of the basket, since it determines whether the form is to be globular, barrel, or bell-shaped. So without decoration, other than a braiding of the binding element on the final round

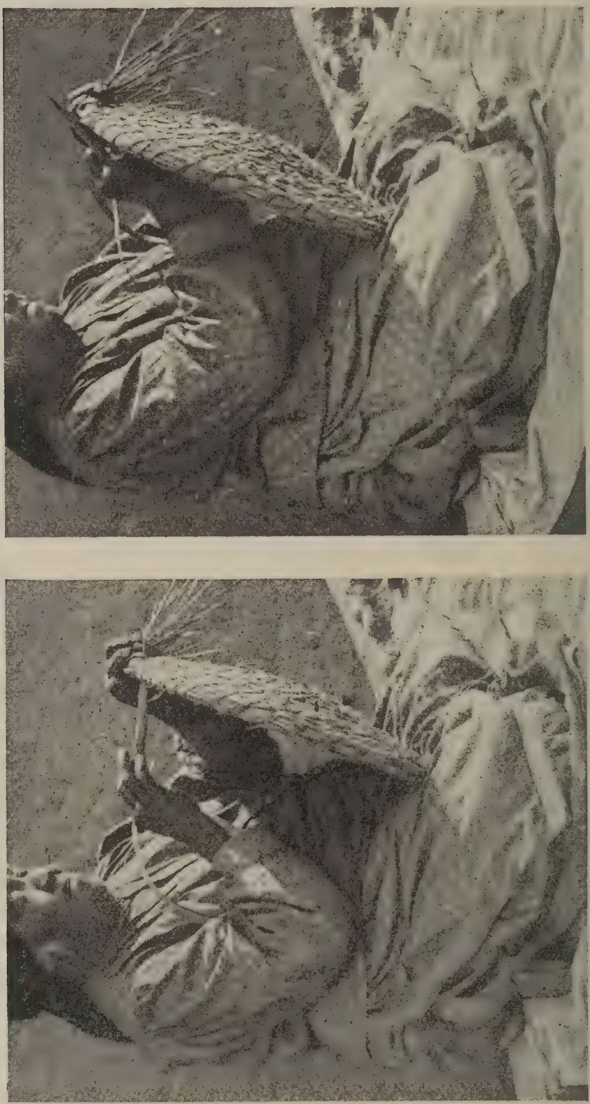
a b

Fig. 36. Pima Basket Maker beginning Coarse Coiling: *a*, wrapping the foundation element; *b*, shaping the center ring to which the first coil is bound.



a b

Fig. 37. Pima Basket Maker: *a*, binding the center ring; *b*, center ring completed.



a b

Fig. 38. Pima Basket Maker: *a*, showing use of large wooden awl; *b*, pushing through the binding element.

Fig. 39. Pima Basket Maker completing a Large Granary. (Photograph by Putnam and Valentine, Los Angeles, Cal.)

of the foundation coil (Fig. 32a), whose purpose, in reality, is as much to give strength to the edge as to decorate, the granary is completed, and its beauty consists entirely in careful shaping and evenness of construction. At times, these bins are built with a double foundation coil, that is, two coils are placed one above the other and bound on together. While this method completes a basket more quickly, it produces a structure far less firm and strong, so that the single foundation coil is more frequently resorted to.

Close Coiling.

The best known basketry of these tribes is close coil, with conventional fret designs in black. It is a more perfect coiling than the last, with its thick foundation and binder of spreading segments exposing the first element, for it has a narrower foundation and a more slender binder of closely set segments, completely covering the groundwork. Otherwise than in size of the two elements and in the set of the binder segments the two seemingly different technics are identical. Obviously this is a fully developed foundation coil of two elements, the foundation and the binder, which jointly move spirally in a counter-clockwise direction from center to rim; while the foundation, a passive spiral, constitutes the groundwork of the technic, and supports the active binding element. This last element follows the foundation in its general movement about the basket, and also revolves in a smaller secondary spiral as it encircles the round of the foundation in process and unites it to that of the previous round by catching into its upper edge between the segments of the binder, without interlocking with them. This smaller secondary spiral is a plain one, which during the process of uniting completely covers the multiple foundation (Fig. 58). Close coiling is the most substantial basket technic of these people, serving in places where great strength and durability are required, together with closeness and evenness of texture, as in the milling industry, the preparation of foods, the transportation of fine grains and seeds, as well as the transporting and raising of water, which was done in the old time water-tight well-buckets and bottle baskets of the Papago.

The Indian villages of this arid land, like the parched vegetation, appear to have sprung out of the brown earth, for when seen from a distance, the dust-covered huts of twigs and mud seem to be a part of the desert itself. Upon coming nearer, however, one discovers that these circular and rectangular shapes are the crude works of man; that here human life is sheltered, and that many of the processes for providing food and clothing are everywhere evident, since signs of these are seen scattered about in black-

ened cooking pots, sticks of charred wood, old cans and bits of rag. In the shade of a rustic arbor, built of tree trunks and roofed over with twigs and mud, stands the water olla on its forked tree-stump, for at this fount the hot and dusty inhabitant of the desert finds cool refreshing drink. Before the door are further indications of domestic activity, an old basket tray charred by hot coals, another stained with red peppers, and to the left a battered adobe oven; while nearby on the ground rests the flat stone-mill, the metate, its supplying wheat tray at one side, its receiving flour tray at the end, although the woman grinder has vanished, for frightened at the approach of strangers, she has hastily fled from her work and escaped into the hut. Beyond, squatting upon the ground, is a neighbor potter plying her art; while far off among the distant mesquite trees is another woman returning from the fields laden with her basket bowl upon her head. Of these busy scenes the ones which interest us most at this point, are those where baskets play an important part, the coiled bowls and trays, which minister to so many Papago and Pima wants. Their varied contents can best be accommodated in these two forms, each shape with a distinct function, though occasionally the tray performs the duty of the bowl, and the bowl that of the tray. Other shapes, the olla and waste-basket forms seen in curio shops, are trade baskets made for white man's use and not for the Indian's.

The primary function of the basket bowl is that of transportation, its secondary use that of a temporary receptacle, (Figs. 42–43). Like the olla water jar, during carrying it is balanced on the head without the aid of the hands, but unlike the olla, at the present day it transports dry produce only, fruits of the cactus, vegetables, grains, berries, and small seeds, while formerly it was employed as a basket for watering horses, drawing water from the well, and similar purposes. Isaac Whittemore in 1893 tells of Pima women removing dirt from irrigation ditches in basket bowls.[1] Still earlier, some thirty or forty years ago, white settlers in Papagueria remembered seeing water carried in two water jar baskets, thrown over the saddle horse on either side, or attached to the saddle itself. The Papago still do much gathering in the basket bowl, but white settlers have located near the Pima villages, thus bringing markets in such close proximity as to discourage much of the old-time gathering of wild things. Besides, for a number of years the United States Government has donated a wagon to each

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[1] "They had not pails or vessels of wood, but were not slow to invent. They therefore took willows which grow in abundance along the river, and a reed, and strip the bark, then very adroitly split these with their teeth, and wove them so closely as to hold water. This they accomplished by means of needles or thorns of cactus. They used these baskets while digging small ditches, the women filling them with earth and carrying them up the bank." (Isaac T. Whittemore, "Among the Pima," p. 53, Albany, N. Y., 1893).

Fig. 40.

Fig. 41.

Fig. 40. Pima Woman winnowing Wheat. The wheat is poured upon a matting and the wind carries away the chaff.

Fig. 41. Pima Woman grinding Wheat. From a basket tray at her side she places a handful of wheat on the metate and after grinding with the muller, pushes the ground flour into a second basket.

Indian family where the man builds an adobe house and cuts his hair. The possession of these wagons has brought the markets within still easier reach, so that this, together with the fact that many of the younger Pima laugh at those who continue to journey for wild things, has lessened the use of the bowl for transportation.

The function of the tray is not that of storage, or transportation, but household service, where it ministers most efficiently (Figs. 40–41). Only on ceremonial occasions is it employed at the present time, as an eating dish, when the small water-tight tray of the Papago medicineman is called into service, both as a drinking cup and a piñole dish, when on expeditions to the sea for sacred salt, and when curing the sick (Fig. 60f). The tray is the most frequently used basket of these tribes, aiding in the preparation of all kinds of foods, and since few of these are eaten raw, it is a most constant helper in their culinary work, taking the place of white man's pan, bowl, and plate, for the cutting up and getting ready for cooking squashes, pumpkins, roots, beans, and other vegetables; different kinds of meats; fruits, berries, seeds, and cereals. This continual use of the basket tray has greatly endeared it to the Indian woman, who handles it with loving care, knowing how repeatedly it has ministered to her wants. How many harvests have come and gone through which it has served her; what a great variety of foods it has protectingly held for her; how many meals it has helped prepare for her hungry household!

Wheat (pelca, or pelka) has been a staple food with the Papago and Pima since introduced by the white man many years ago. In prosperous seasons the Pima do not mill their wheat, they exchange it for flour; but when times are hard they return to their old custom of milling the wheat. Few of the Papago buy flour even in prosperous years, but continue the old methods of milling. For this the tray serves in two distinct processes, in the winnowing and in the grinding. Wheat is winnowed in two ways: it may be tossed in the tray, or poured from it onto a canvas spread upon the ground (Fig. 40); in either case, the wind acts as the agent for disposing of the chaff, for the winnower so places herself that it will be carried off in this way. When following the first method, the woman sits on the ground and lightly and deftly tosses the wheat kernels which have been previously loosened from their hulls. At times between tossing she gives them a hard rub on the base of the tray to loosen any hull that still adheres to the kernel; then she continues the tossing without losing a grain over the rim, while the wind takes care of the chaff. During the second method of winnowing the woman stands while she pours the wheat from her tray basket upon the square of canvas, and the hulled kernels fall to the ground, the wind disposing of the chaff (Fig. 40).

In flour making the grinding process follows that of winnowing. This is done on the heavy stone metate, (Fig. 41), a flat rectangular stone with a slight dip on its upper surface. It is usually found standing near at hand just outside the door, or under the rustic arbor, or if inside, within the storage shed, or possibly, but more rarely, within the house itself. During grinding, the metate may rest flat upon the ground without a prop, but more commonly it is tilted a bit at the front edge on a small stone. The wheat is ground upon its surface by means of a flat rectangular muller stone rubbed across it; and it is a hard grind the Indian woman must give her grain to turn it into flour. From the supply tray at her right, she puts a handful of unground grain upon the metate, and rubs the muller over it, until it is very fine, when she pushes the ground flour over the back edge into the flour tray beyond. Incidentally, a minor process enters into milling before the grinding, that of cleaning the wheat, as it must be thoroughly looked over and freed of stray seeds and bits of dirt that may have fallen in among the kernels of wheat. A deeper tray is used for this, if the family is provided with trays of varying depths, since there is less danger of spilling the grain as it is pushed about with the hands, or rocked from side to side, that all the stray specks and dirt may be found.

Ground wheat, corn, and other seeds are cooked in a number of ways: baked in loaves, or tortillas, fried in suet; or boiled in soups and gruels. In most of these instances, the basket tray serves as the mixing dish, holds the dough while waiting to be placed on the fire, and receives the food when cooked and ready for serving. Only one instance was reported where in former times the tray served as an eating plate for a mixture of corn and beans similar to succotash.

Another grinding process is carried on not by rubbing, but by crushing in a wooden mortar constructed of a cottonwood stump, when either a vertical section is hollowed out at one end and the stump stood on the other end (Fig. 42); or a horizontal section is dug out on one side, or around a knot hole (Fig. 75a). The size of the stone pestle for crushing, varies from a very light weight to one of such heft as to require both hands in the lifting, since it is suited to the seeds to be ground. The food most frequently so crushed, or ground, is the mesquite bean; although other beans and seeds are put through the same process, during which, as in grinding on the metate, both supplying and receiving baskets are present (Fig. 42).

For parching wheat with live coals, a pan, or a wooden tray, is now ordinarily employed, but when neither is handy, the Indian woman finds for this purpose a much-worn basket tray, as is attested by the scorched and charred linings of numbers of these old trays, and this, no doubt, was the old custom before civilization brought the pan and the wooden tray.

Fig. 42.

Fig. 43.

Fig. 42. Grinding Mesquite Beans in a Wooden Mortar made from a Cottonwood Stump.

Fig. 43. Pima Woman parching Wheat with Live Coals; one bowl contains unparched and the other parched wheat.

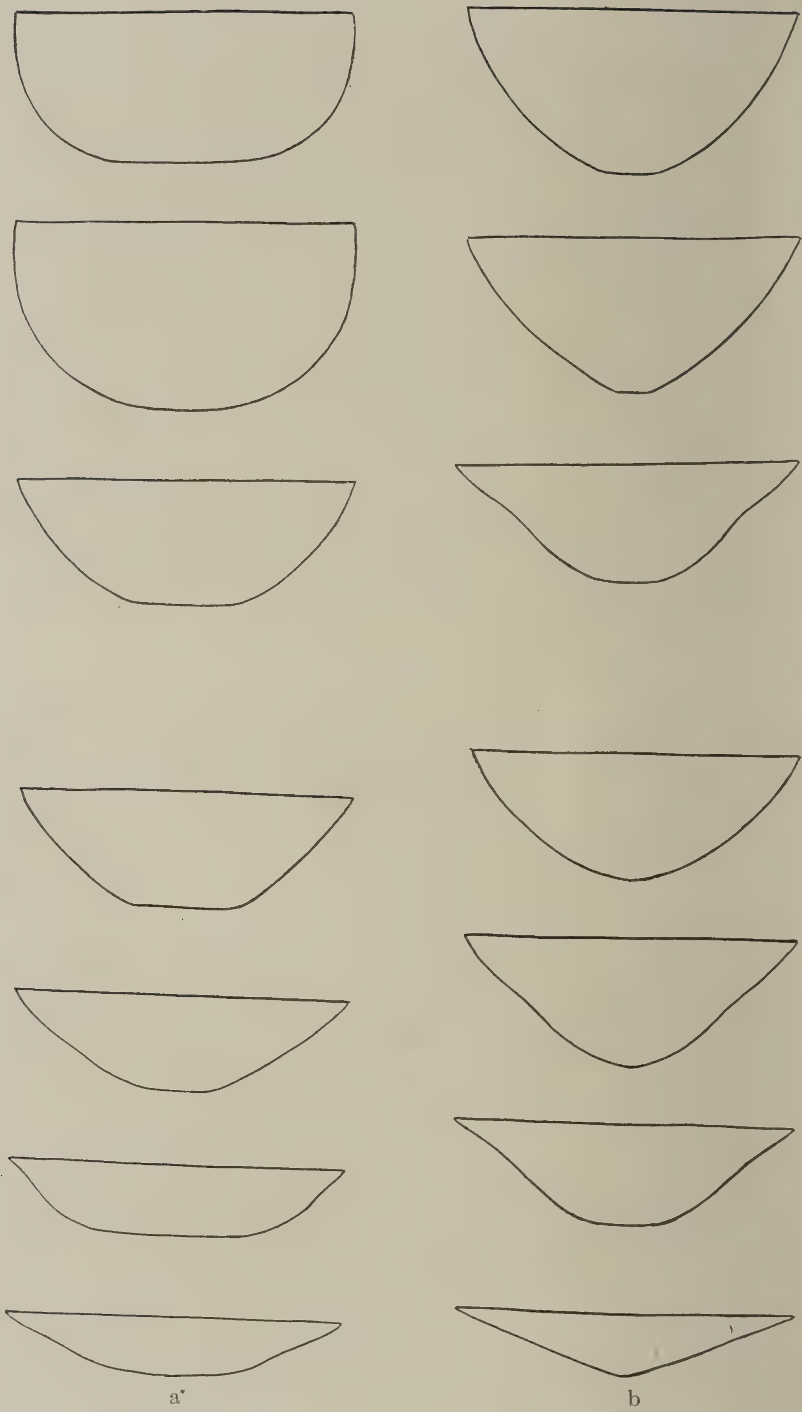


Fig. 44. Forms of Papago and Pima Bowls and Trays: *a*, Papago; *b*, Pima.

For the parching, live coals are raked into the tray and the grain thrown in on top, when a series of tosses brings the lighter coals to the top, and sends the wheat to the bottom; continued tossing keeps the two in motion, and a puff of breath blows the ashes away. When the process is completed the ever-present basket receives the parched grain as did a similar utensil furnish the unparched grain (Fig. 43). Wheat is also roasted in a bit of broken pottery, over the live coals of the open fire within the hut.

Trays of close coiling frequently take the place of covers for the large grain bins of coarse coiling and for pottery ollas. It is seldom a new tray acts in this capacity, more usually it is the impaired trays, or the broken-out base of some old bowl or tray which serves the purpose of a cover.

In addition to the utilitarian functions of the basket tray, it has another, a ceremonial use, for turned wrong side up any hard firm tray of sufficient size, such as are in common household use, may be called to act as a drum upon ceremonial occasions, either at dances, or when the medicineman is doctoring the sick or modifying the weather conditions. At these ceremonies, the medicineman accompanies his songs with a beating on the basket drum in rhythm either with the hand, or a stick.

Besides baskets for their own use, the Papago make a basket for sale of sotol (*Yucca elata*) upon a foundation of beargrass (Figs. 67 and 69). These are not so strong or smooth as those made of "tree material" for household use, and are only called into domestic service when the Indian woman finds all her baskets of "tree material" are otherwise employed. The sotol basket is disposed of rapidly to curio dealers, missionaries, and others interested in helping the Indians financially. From this extensive distribution of the sale basket has come the false report that Papago coiled baskets are constructed exclusively of sotol.

In proportion and general contour Papago bowls are broad, globular, flat based forms (Figs. 44 and 59d), whose qualities of shape harmonize with their heavy, solid, unyielding construction, which when function requires are water-tight (Fig. 59b). As would be expected, the wall is thick (Fig. 59b and 65c) and hard, and built with full, well-rounded curves, and a soft edge, tending at times to curve inward (Figs. 59b, d). The Papago trays follow the same plan as the bowls, although the slight height of the tray form, excludes some of the qualities shown in the bowls (Fig. 44). Papago water basket jars, now no longer used, were tall, slender, bottle shapes with an incurving neck. In general proportion and shape, Pima bowls are taller and more oval than Papago bowls, with a narrow curved base (Figs. 63a, 65d, 44). Their build is lighter, more pliable, and never water-tight; their contour more subtle in line, with sweeping upspringing curves; the wall thin and springy; the edge sharp and clean cut, with no

tendency toward incurving. As with the Papago, the tray forms of the Pima have similar characteristics to the Pima bowls (Fig. 44).

In size, Papago bowls range from 40 cm. to 50 cm. in diameter, and 18 cm. to 22 cm. in depth (Fig. 44); the deep trays from 40 cm. to 50 cm. in diameter and 11 cm. to 16 cm. in depth (Fig. 44); and the shallow trays from 32 cm. to 40 cm. in diameter and 4 cm. to 7 cm. in depth (Fig. 44). Pima bowls are slightly taller than those of the Papago (Fig. 44) and their trays are slightly broader (Fig. 44).

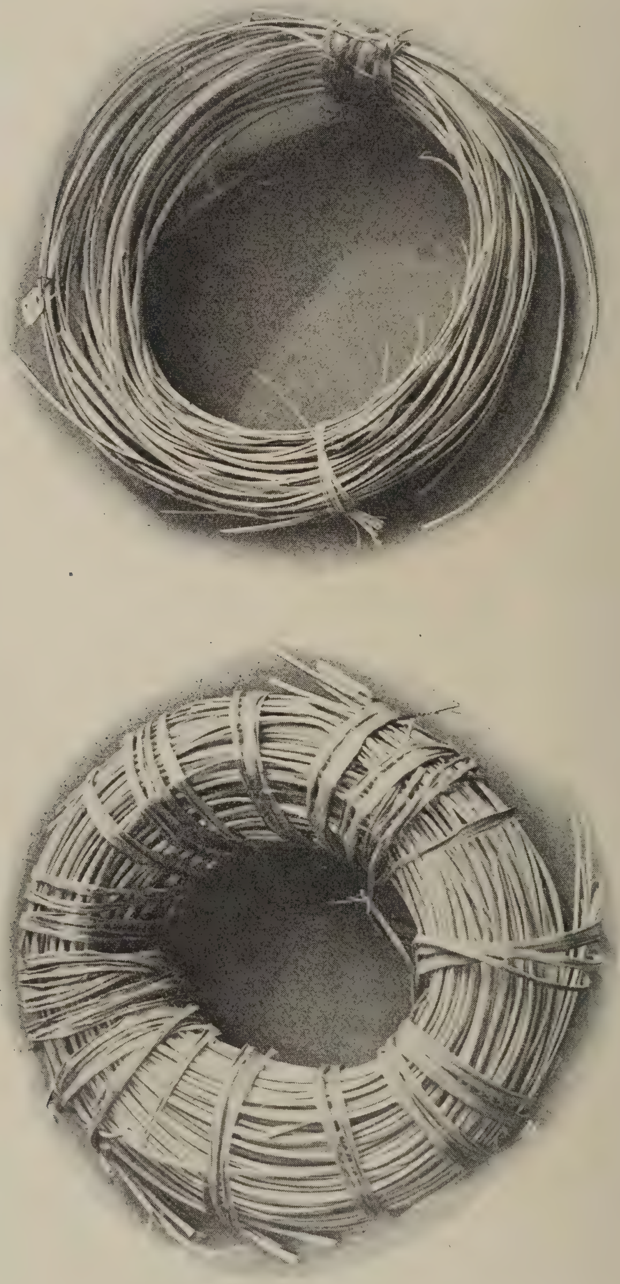
The material for the foundation element of the Papago is beargrass (*Nolina erumpems*), although Spanish bayonet (*Yucca baccata*) is substituted as a makeshift when beargrass cannot be obtained; the foundation element of the Pima is cat-tail (*Typha angustifolio*), and when this is lacking the poorer parts of old cottonwood twigs (*Populus fremontii*). Summer is the season for harvesting beargrass, when the women generally go for it in groups, at the present time in wagons, but formerly on foot. Even when the trip is taken by wagon, an entire day is none too long for the journey, so when the time arrives for a particular group of friends to gather this basket material in the foothills, they must get an early morning start. Beargrass grows in great bunches from 30 cm. to 60 cm. in diameter, and from 60 cm. to 90 cm. in height. In the center of these clusters the grass stands erect, but around the edge it is dry and bends to the ground; so this outer portion is rejected by the gatherers and only the center cut away with axes and large butcher knives. Each woman collects for herself as much as she needs, some selecting with care the material in the best condition, others gathering more carelessly; when the beargrass is carried home it is laid on the ground to dry in the sun for four or five days, but it must be taken in during showers. When needed for basketry it is taken without moistening, and split by the teeth, fingers, finger-nails, or at times a knife, and worked into the basket, dry. Spanish bayonet is employed by the Papago when beargrass is not at hand; its preparation and use does not differ from that of the latter material. A third material for the foundation was reported by one woman in Little Tucson who remembered the Papago years ago using a "tree material," but what this tree was she did not know. Cat-tail is gathered by the Pima in a manner similar to that of beargrass, although it is found nearer the villages, so the journey is not so long. As with the Papago, these harvestings are social affairs, where the women take their lunches and spend the day. The hollow stem of the plant is the part needed for the foundation element, which is split dry, and worked into the basket without moistening (Fig. 48). In districts where the Pima cannot obtain cat-tail they substitute a foundation material which constructs a coarser basket than the cat-tail, that of finely split twigs of cottonwood, but only those which are too

old and brittle to serve as a binder material, since pliable twigs are too precious to be used in this way.

The materials for the binding element are the same in both tribes, except on Papago sale baskets and a few for home use. These materials, with this exception, are splints of willow (*Salix nigra*), and of cottonwood (*Populus fremontii*) found mostly in the Pima habitat, and splints from the seedpods of martynia (*Martynia probosidea*) found in both habitats. To these is added a fourth material for the exceptional Papago baskets, the sotol (*Yucca elata*). Spring is the season for gathering twigs, the willows (Fig. 45), and the cottonwood, autumn is the time of year when martynia is ripe (Fig. 46); and summer is the harvest time for sotol.

When the first green leaves appear in the spring, the Indian woman goes out to cut the willow twigs from the trees which border the few small streams, or the dry stream beds. Around the foot of the tree, and on the trunk, where a bunch of fresh growth is sent up, she finds the pliable young twigs suitable for basket work and although the first she can easily obtain, for the last she must climb. The twigs are cut with a sharp knife, tied into bundles and carried home upon the head, or in the kiaha on the back, where they are immediately cleared of the bark, as otherwise it will adhere to the wood. In olden days, the Indians loosened it from the wood by boiling, but that practice has long since been abandoned. In stripping off the bark, the start may be made from an end of the twig, or the teeth may lift the bark midway between the ends, and the inserted thumbs then peel it off to the extremities of the twig. This removes one half the bark, another such stripping clears the other side of the twig, and the ends of these barkless twigs are split in two by the teeth and stripped apart with the fingers. For a finer binding element the strips are again split, after which they are rolled into coils ready for barter or storage (Fig. 45). Before using for basket-making, a thorough soaking is necessary, but only of a few splints at a time. Cottonwood splints are gathered, prepared, and used as those of the willow, and yield a whiter, less smooth and less durable binding element than the willow.

Sotol is a yucca from the higher mesas. Its long narrow leaves, radiating from the central stem, are used for the binding element on Papago sale baskets. Only the young, tender, inside leaves at the center of the plant are suitable and are grasped and pulled out with the hands, stripped immediately of their stringy edges, and split down the center midrib with the basket awl, before being spread on the ground for two or three days to dry. When wanted for coiling, a few strips are soaked in hot water for a short time, and then wrapped in a cloth to keep damp, but before using, the midrib is shaved off with a knife by holding the strip taut between the teeth and the left hand while using the knife with the right.



b

a

Fig. 45 (50.1–5291, 5134). *a*, Willow Twigs for Coiled Basketry; *b*, Finer Splints of Willow ready for Coiled Basketry.

b

a

Fig. 46 (50.1–5139, 5137). *a*, Martynia Pod; *b*, Martynia Splints for Black Designs on Coiled Basketry.

Martino, popularly called martynia, and also devil's claw, is the black material employed for designs. It is the peculiar shaped seed pod of martynia, which furnishes the basket material, for from the long elliptical pod extend two slender hooks from 20 cm. to 35 cm. long. From the back and front of these hooks are stripped short black splints, two from each hook (Fig. 46). Aside from this decorative use, martynia has another very practical one, that of supplying strength to parts of baskets receiving the greatest strain and hard usage, as it is the toughest and most durable basket material of the region. For this reason, it is used to construct the base of baskets in both tribes, the edge of the Pima ware, and many entire Papago bowls where a very strong structure is desired. Although martynia grows wild, most of the Indians seed it in their fields, since they find the cultivated plant yields pods with hooks of greater length, finer grain, and a better black. Only a few of the more shiftless Indians gather it wild. Martynia, both the cultivated and the wild, is collected in autumn when the seeds have ripened, but it must not be allowed to get frosted, for should the frost touch the pod-hooks, they will lose their good black, and become a dull grey. The pods are broken from the plant with the hands, hooked together in great bunches, wrapped in a cloth, and taken home either on the head, or in the kiaha. They are already dry when gathered, and as they are not stripped at this time, are now in condition for barter, or for storage.

When material is needed for basket-making, some of the pods are taken from the bunch and buried for a day in a damp hole under ground, with water poured over, although occasionally one finds a woman who has abandoned the old method and simply soaks her martynia pods in boiling water. When the pods are well moistened, the basket maker seats herself on the ground near the hole where the pods are soaking, and reaching for a pod (Fig. 46) splits two strips from each hook, one from the front, the other from the back. The woman here (Fig. 47) has relinquished the old position and prefers sitting upon a box instead. For stripping, the point of the hook is split into three, either with the teeth, or with the sharp basket awl against a board when the hook is stripped into three parts by holding securely between the teeth one of the outside divisions while the fingers peel away from it the remaining portion of the hook. The other outside strip is then torn off, when the outside strips are gathered together in bunches till needed (Fig. 46). When wanted for basketry, a few splints are again moistened and the white pithy wood which adheres to the inner side of these strips is scraped away with a knife, while the splint is held between the teeth and the left hand.

Nature has provided the Indian woman with her most valuable basket tools, the fingers, teeth, and feet. She supplements these natural tools

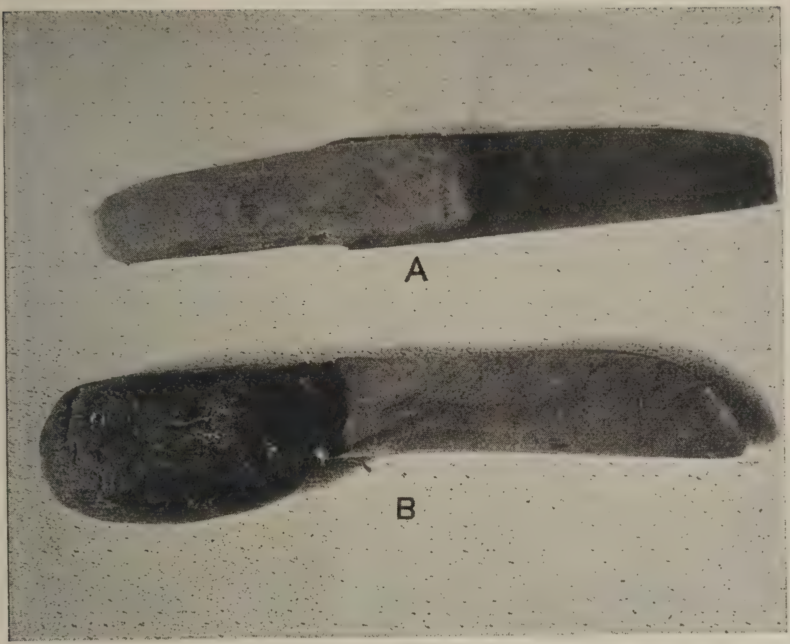
with artificial aids, the ax, or hatchet, the knife and the awl for assisting in the gathering, the preparation, and use of her basket materials. These tools she now may purchase from a neighboring city of the white man, if it is not too distant; but more often she fashions them herself, for frequently her home is in a remote village. The tool-fashioning skill of the Papago exceeds that of the Pima, especially in making the awl, which is a more shapely and carefully constructed tool than that of the Pima. In fact the Papago are neater, more thrifty, and painstaking in many ways, although in basket technic they are excelled by the Pima.

Of the tools for cutting, the largest is the ax, formerly of stone, but now a store-bought article, used for felling coarse materials such as beargrass. As a substitute for the ax in gathering lighter weight materials and cutting twigs the large butcher knife is employed; for the preparation of material, knives of all sizes, preferably the smaller are in use. These last may be old case knives, whole or broken off blades, or the knife may be something put together by the Indian herself, an old picked up blade, rubbed into shape on a stone and furnished with a handle of gum, or of two bits of wood gummed to the blade (Fig. 49a).

Along with the cutting tool there is required one for perforating holes for the passage of the binding element. The sharp pointed awl meets this need, supplied in early days by a needle or a thorn of cactus, and later by a bone or a bit of mesquite wood.[1] At present, the only materials employed to make these tools are nails or bits of old umbrella rib rubbed to a point upon a stone, while those for the handles of these points are wood, or gum. Wooden handles have the bits of umbrella rib either driven in with a stone, or burned in after heating if the wood is hard, when the steel may be run into either end of the handle. The simplest method is to sharpen the steel and drive the point up through the handle from its lower end, but this method is not practised as frequently as that of pushing in the steel from above, either sharpened or unsharpened. The unsharpened steels, when run in from above, are driven into the handle and the remaining exposed steel then sharpened; the sharpened steels may have their points driven in, or burned in, before the remaining exposed portion is sharpened. When the steel point is completed the handle is shaped by whittling and smoothing with a knife. Papago handles are of mesquite wood, or old broom handles; Pima are of willow, cottonwood, mesquite wood, mesquite root, or some old tool handle. The material for gum handles is the secretion of a tiny insect (*Carteria larreae*), found upon the greasewood twigs. This twig bearing the secretion is broken off, held over the fire until the gum is softened, and

[1] Isaac T. Whittemore, *ibid.*, 52; Frank Russell, *ibid.*, 135.

Fig. 47. Splitting the Martynia.
Fig. 48. Splitting Beargrass for the Foundation Element.



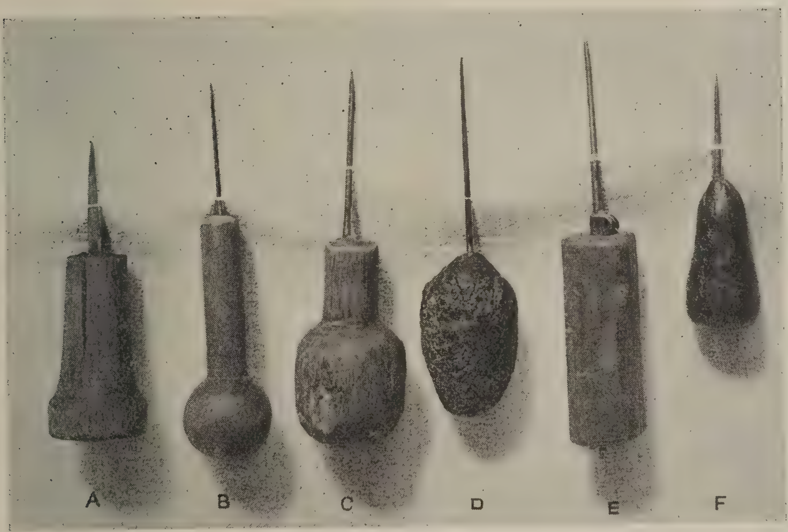


Fig. 49 (50.1–5161, 5162, 5218, 5221, 5155, 5216, 5156, 5157). Basketry Tools, Papago.

then shaped with the fingers about the end of the steel, when, with cooling, the gum becomes hard like wood (Fig. 49b). Another gum less frequently used is creosote (*Covillea tridentata,* or *Larrea Mexicano*).

At almost any hour of the day one will find some Papago or Pima woman before the door of her hut at basket-making. Like other duties, this is a part of the regular work of this busy woman, for she is expected not only to tend to the regular household affairs, but to bring all the fuel and water and in olden days to help in the fields, and for these she has need of utensils for pottery and basketry and so must provide herself with them. Most basket makers learn the art from their mothers when young girls, but now and then one is found who has acquired the craft when a grown woman. Judging from the present results of makers of coiled ware it takes a lifetime to perfect the art, since the old women are now making the best baskets, although it is possible that this is due to the influx of civilization which tempts the younger generation to abandon the old arts for the customs of the white man.

When making coiled baskets the Indian woman sits tailor fashion on the ground upon a square of canvas (Fig. 53). If the day is hot she selects some comfortable spot, usually on the shady side of the hut; if cool, she sits in the sun; but when cold weather sets in she is driven within doors, except during the warm midday. Within she plies her art just inside the door, her only means of light as few huts have windows, but when very cold days come she may be forced to stop basket work entirely for then the door is closed. Then she squats beside the low fireplace with its fire of mesquite wood, or before a pan of hot coals in the middle of the room, for these women wear very little clothing, perhaps nothing but a cotton dress even in the coldest weather. Placed beside the basket maker, to assist in the work, are the dish of water for moistening and soaking the materials; the basket tools, a knife and an awl (Fig. 49); as well as the materials, the dry split beargrass, or cat-tail, lying loosely on the ground for the foundation, and the willow, cottonwood, or martynia splints (Figs. 45–46) soaking in the dish, or the yucca wrapped in a dampened cloth for the binding element.

Coiling is begun by most peoples with a bit of the foundation material bunched together, bound, and then coiled in concentric circles. Few tribes deviate from this method, but the Pima and Papago make a very different beginning, a plaited center, most commonly constructed with six strips of binding material arranged in two groups of three strips each, and during the making either laid on the knee or held in the left hand during the first few moves. The two groups are placed so as to cross each other at right angles near their center, as seen in Fig. 50[a], which is the back of the center. One set of ends of the lower group is then bent up and over the front so as

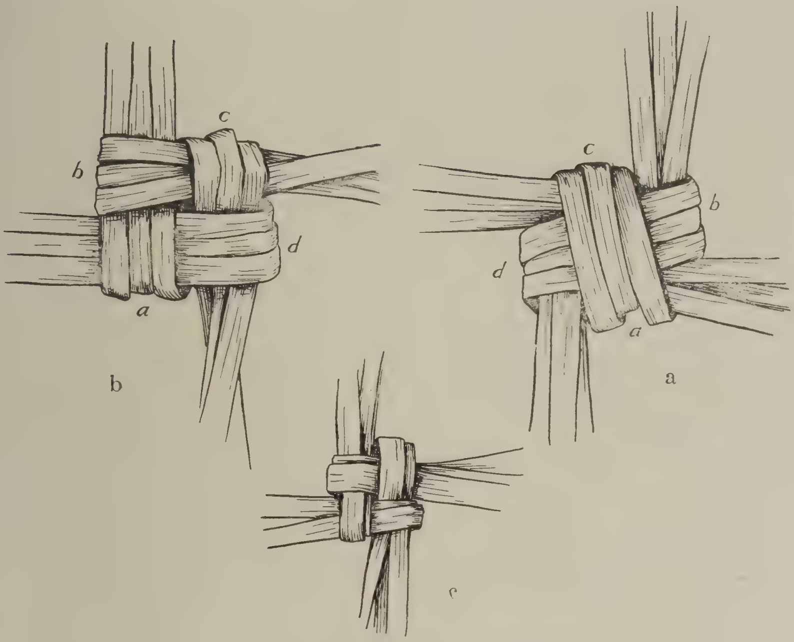


Fig. 50. Beginning of Close Coiling.

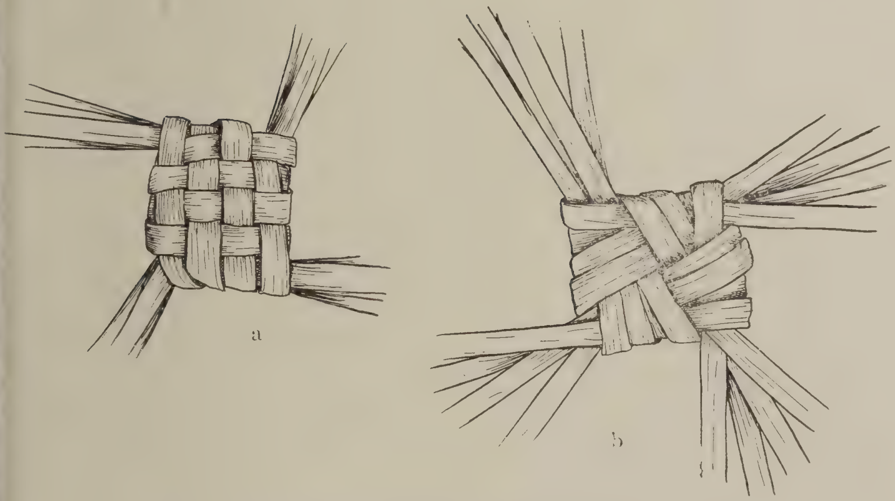


Fig. 51 (50.1–5124a). A Second Close Coil Beginning, Papago.

to pass over its own strips, but deviating slightly toward the left (Fig. 50a [a]). The next group of ends, the left, is similarly bent, crossing it at right angles over the first group of ends (Fig. 50b [b]). The third group is similarly bent, crossing the second ends (Fig. 50c [b]), and finally the last group is bent across the third group, but it must be slipped under the first group to hold securely (Fig. 50d [b]). The ends are now pulled tightly in place that the center may show four small squares within a large one (Fig. 50 [b]). At this point the center is turned over, so that the four small squares will be below, and the

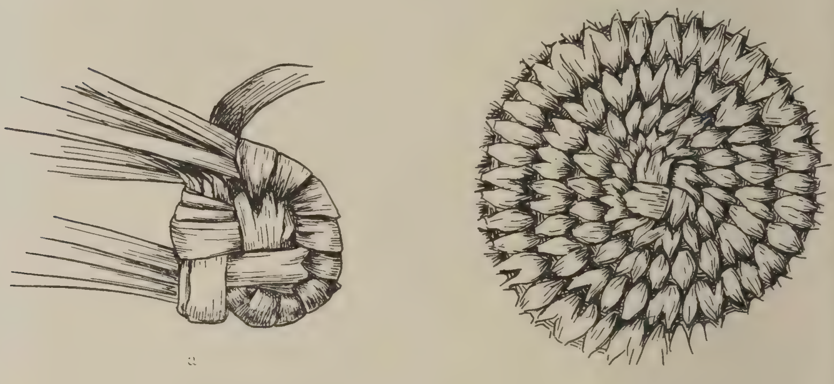


Fig. 52 (50.1–5125, 5196). *a*, Coiling Begun; *b*, Further Coiling, Papago.

first diagonal crossing of the two groups will be above (Fig. 50 [a]). Each set of ends must now duplicate the moves before made on the front, that is, each group is bent so as to cross the center in regular succession to form the four squares, giving a second face like Fig. 50 [b], or a double faced center as in Fig. 50 [c].

Another center is occasionally used, although it is not so common as the one just described. Its eight strips are arranged in two groups of four elements each, which cross at right angles, and plait over and under one another in regular checked plaiting (Fig. 51a). The four ends of one side are then bent across the top as in the first group of ends described in the previous center (Fig. 50). In like manner, the ends of each side are taken in successive rotation and bent across the previous set as in the groups of ends in the previous center (Fig. 50–51).

Either of these centers is now ready for regular coiling to begin, before which, however, all the strip ends must again be wet to avoid breaking when bent. A group of ends is then turned to the left to act as a foundation and bound down to the center by an extra binding element which is added here. It passes around the group of ends and into the edge of the center through a

hole already pierced by the woman's awl (Figs. 54, 56), and so continues until the second group of ends is reached, when this group is turned to the left and bound down as the last group (Fig. 52a). This is continued until the point is reached where the binding element was first introduced, when splints of the foundation element, beargrass or cat-tail, are added to the splints already acting as a foundation and all are caught down as before by the binding element, which enters the edge of the first row of coiling. The binder enters the previous coil between the segments of the spiral, or stitches as they are sometimes called, and does not interlock with them (Fig. 52b). Pima basket makers are very exact in this placing of the binding element, giving their baskets a more ridged surface, while the Papago are less particular, producing a rougher, less even surface.

So coiling continues until the base has reached the desired size, when the walls are begun by a change in the position of the foundation coil in process. This is not placed, as before, on the top of the last round of coiling, but is bound to its side and at such an angle as is proposed for the erected wall. It is this shifting of the position of the foundation coil which makes possible the shaping process, allowing the walls by incurving, or outcurving, to alter their outline to suit the fancy of the maker. Figs. 53–58 show quite clearly the process of coiling: the woman's position on the ground in front of her hut (Fig. 53); the puncturing of the hole by the pointed awl (Fig. 54); the biting sharp the end of the binder so that it may easily enter the hole when the awl is lifted (Fig. 55); the pushing of the binder through the hole (Fig. 56); the pulling it tight and the holding of the awl when not in use (Fig. 57); and the adding new splints to the foundation (Fig. 58). New binding splints are joined by pushing the new splint through the last binding hole and covering the last segment of the old splint before entering the newly punctured hole. Figs. 53–57 show a Papago basket maker at work on the small beginning of a coiled basket, and Fig. 58 represents a Pima woman with an almost completed bowl adding fresh foundation material.

Grim necessity no doubt had much to do with the development of shape, size, and technic in basketry, but other causes are responsible for the presence of design and the finer qualities of craftsmanship, for it was freedom from the strain of necessity which nurtured into being the fine arts. Leisure and abundance of time, is the staunch friend of the Indian in working out basketry decoration, time to play with her units of design, to arrange them into patterns to best fit them to the purpose in hand. So in the designs on the foundation coil of these tribes, which in abundance and elaborateness of pattern hold first place among their basket technics, there are interesting examples of invention and adaptation. The design of foundation coil is less influenced by technic than other kinds of basketry, especially when

Fig. 53. Papago Basket Maker, showing general position.
Fig. 54. Papago Basket Maker, showing use of the awl.

Fig. 55. Papago Basket Maker biting Sharp the Binding Element.

Fig. 56. Papago Basket Maker inserting the Binding Element in the Hole made by the Awl.

Fig. 57. Papago Basket Maker tightening the Binding Element.
Fig. 58. Pima Basket Maker adding Foundation Material.

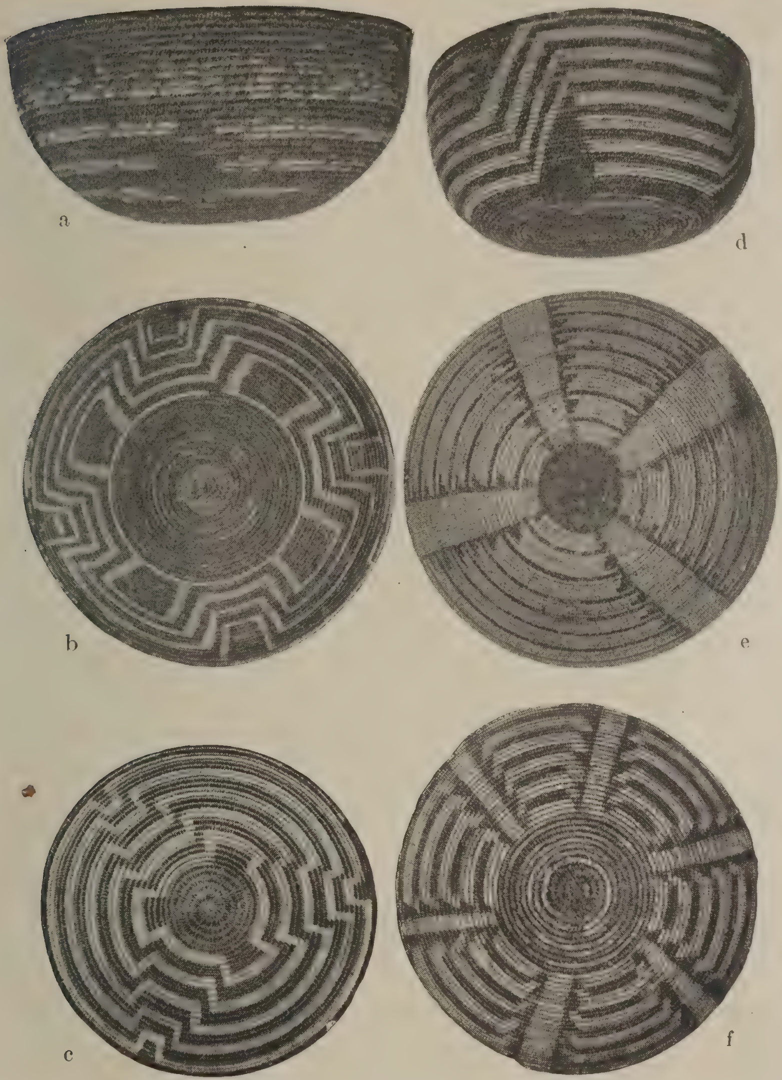


Fig. 59 (50.1–5174, 5176, 5179, 5177, 5182, 5115). Papago Baskets. Old water-tight baskets of exceptional interest.

Fig. 60 (50.1–5112, 5181, 5308, 4205, 5280, 5187). Papago and Pima Baskets: *a*, *b*, *f*, Papago; *c*, *d*, *e*, Pima. *f* is specially interesting as the food tray of the medicineman of Santa Rosa.

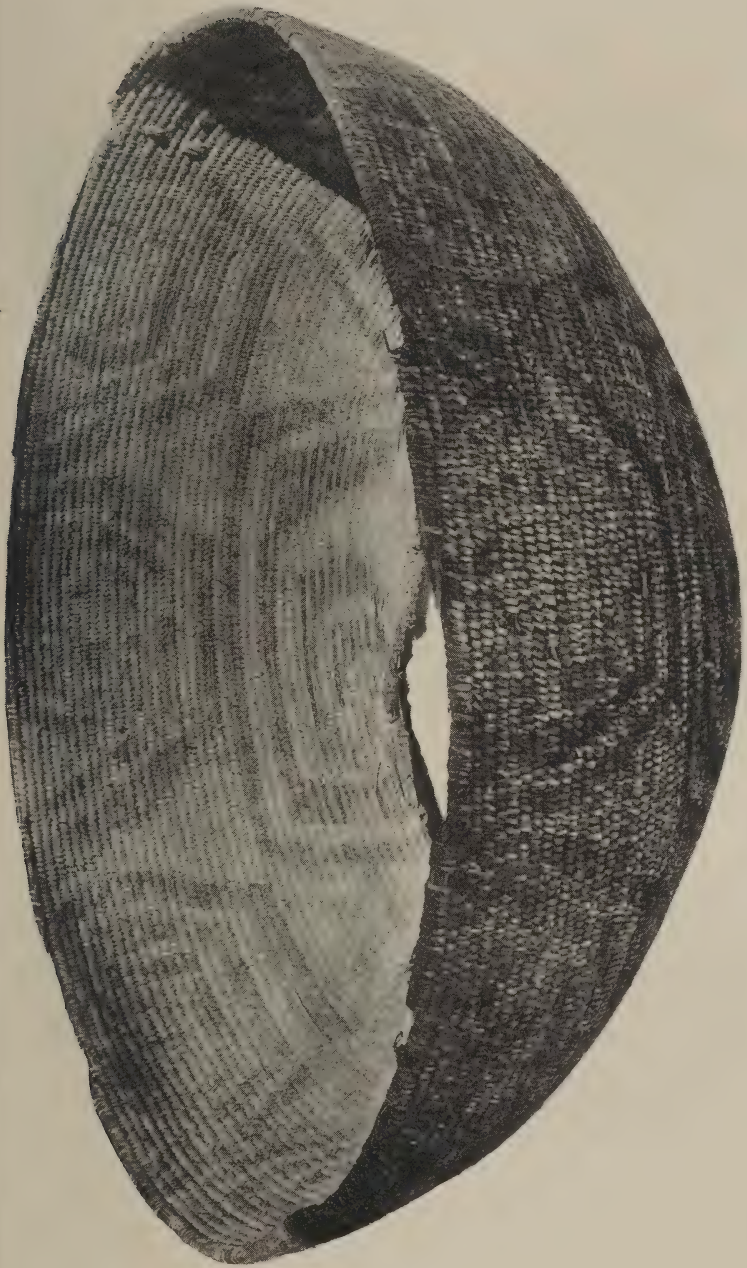


Fig. 61 (50.1–5172). Old Papago Bowl, five generations old, showing long hard use, as well as an advanced state of the art of coiled basketry when it was made.

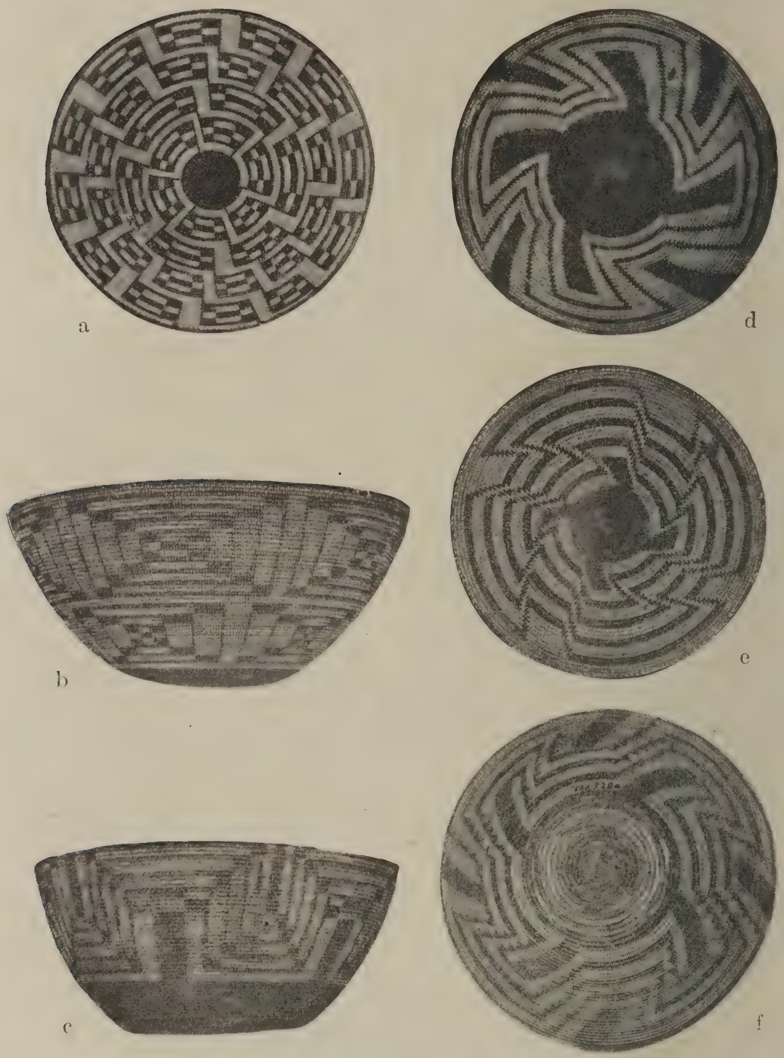


Fig. 62 (50.1–4769, 4770, 4786, 5306, 5185, 5282). Pima and Papago Baskets. *a, d, e, f,* Pima; *b, c,* Papago.

Fig. 63 (50.1–4109, 4724, 5282, 5175, 50–2748, 50.1–5264). Pima Baskets.

Fig. 64 (50.1–4045, 4106, 4207, 5254, 5310, 5265). Papago and Pima Baskets. *a, b*, Papago; *c, d, e, f*, Pima.

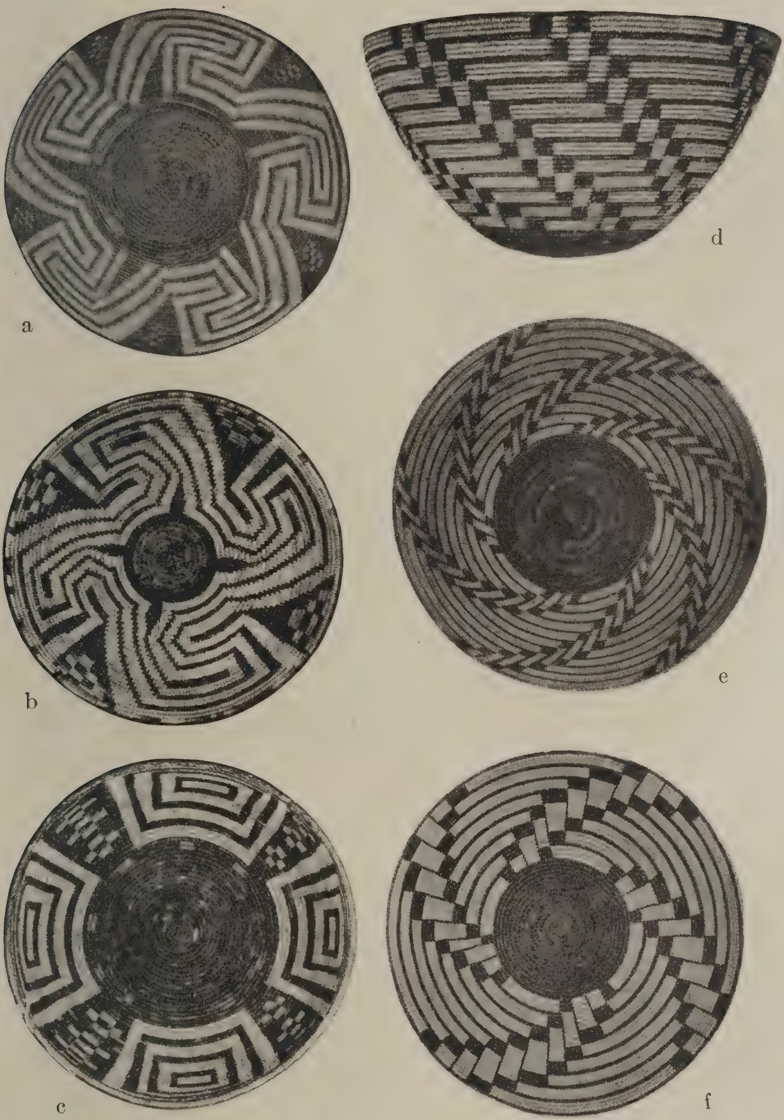


Fig. 65 (50.1–5253, 4103, 4566, 4716, 4717, 5309). Pima and Papago Baskets: *a, b, d, e, f*, Pima; *c*, Papago.

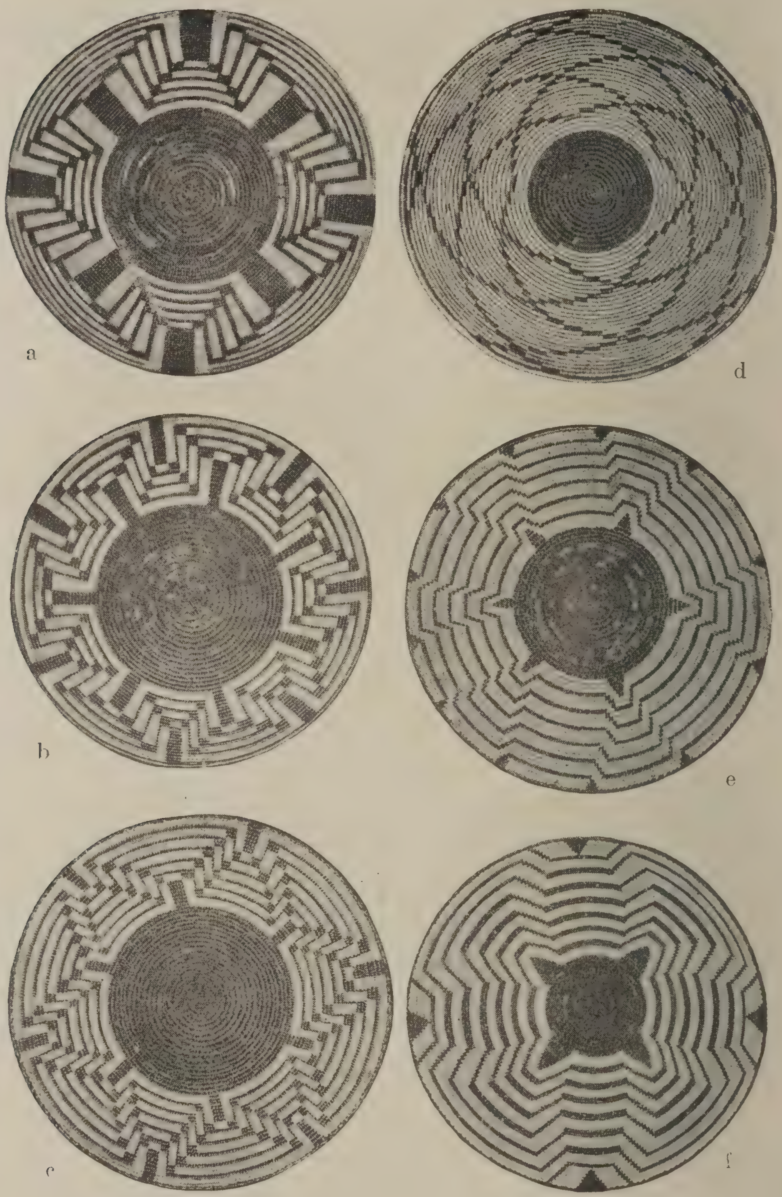


Fig. 66 (50.1–5305, 4730, 5329, 5183, 5245, 5256). Pima Baskets.

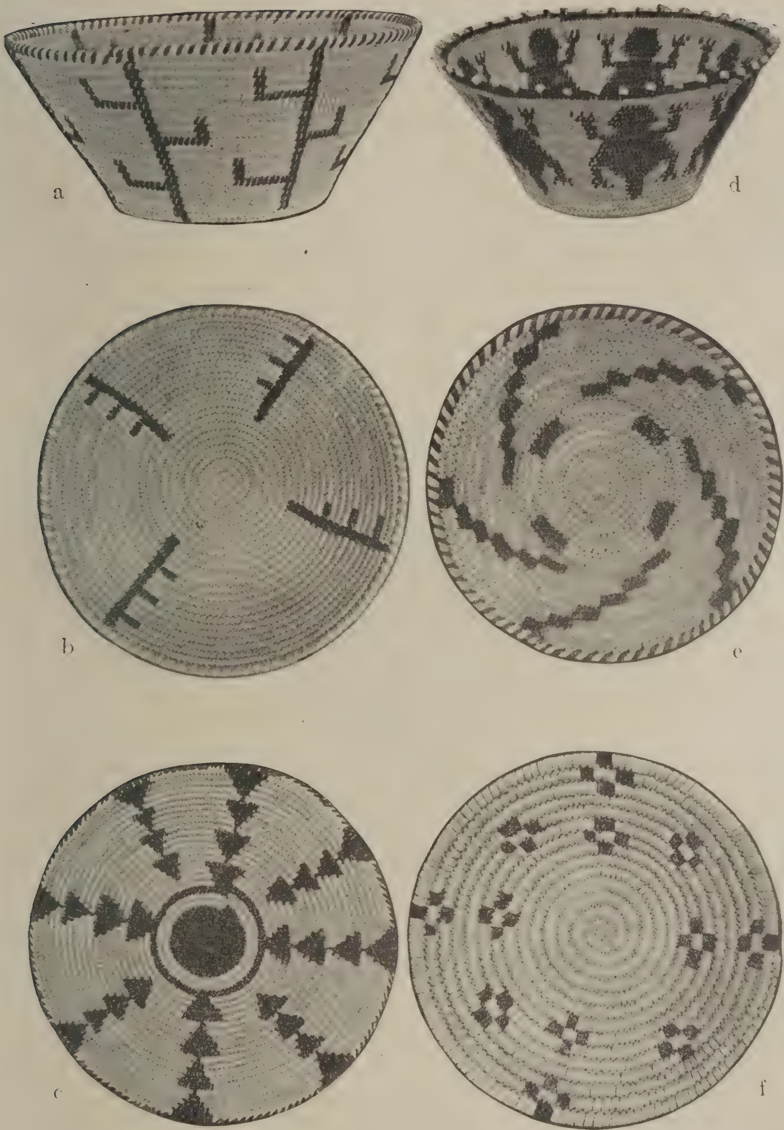


Fig. 67 (50.1–4190, 4089, 5197, 4191, 4088, 4065). Modern Papago Baskets.

the binding splints are narrow and the foundation coil slender. The greatest limitation comes from the width of the foundation element, whose breadth is troublesome in arranging curves, which must be built in series of steps.

Design here is in black and light straw color; more usually a black pattern on a light ground, as with the Pima, and at times, the Papago; or a light pattern on a black ground as only with the Papago. The decoration is in line design, with at times accented portions, producing a fine dark and light effect as seen in the strong bold decoration of the Papago. Constant trading and interchange between the two tribes has mingled designs, making the decision difficult to which tribe a design belongs, for often designs from both tribes are found on the same basket. However, the

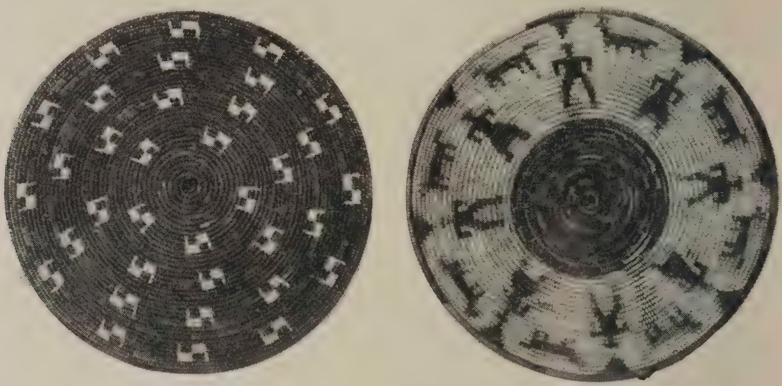


Fig. 68 (50.1–5303, 5113). Modern Papago Baskets.

general plan for Papago and Pima baskets is the same, a base of solid black, the entire wall acting as the field of design which is entirely filled with pattern.

As to the design motives, there are several theories, both as to the origin and design significance. Dr. Lumholtz states in his narrative of the Papago:—

> That significance of decorative design is almost entirely forgotten. There is only one woman at the present time who is able to do first-class basket work and she cannot tell what the design means.[1]

Dr. Russell on his visit to the Pima records:—

> When questioned as to the meaning of the elements of these patterns, the basket-makers invariably replied: 'I do not know; the old women make them this way. They copied the patterns long ago from the Hohokam pottery.'[2]

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[1] Lumholtz, Carl. "New trails in Mexico," 353.
[2] Russell, Frank. *Ibid.*, 135.

The information given by the older Papago and Pima women in 1910–1911 was much the same as the last, "I do not know, the old women make them so." None of these, however, reported their being copied from the old pottery, quite possibly the women who so reported in 1901–1902 were gone. Besides, the copying has yet to be proven by a more intensive study of collections of prehistoric pottery from the region in relation to the basketry pattern. It may be found that Papago design motives are indigenous — survivals of an older prehistoric basketry design. Their strong direct simplicity suggests this, but a sufficiently comprehensive study has not as yet been made to substantiate this theory. It is hoped that the Quijotoa, Comobabi, and Baboquivari villages will yield up to some future investigator something of value on this lore.

Although the older women furnished the above report, some of the

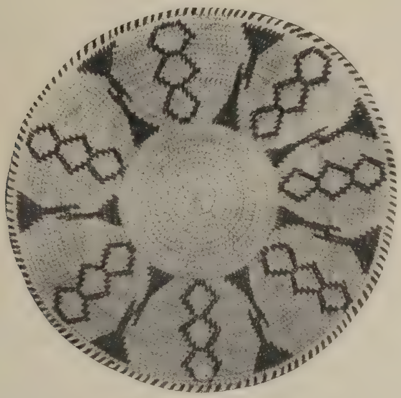

Fig. 69 (50.1–5194). Modern Papago Basket.

younger and more commercially inclined gave names to the more common designs. To all appearances these women had responded to the questions of travelers, who for years have been visiting here, for the meanings of these patterns, and were reading into them modern names, such as recorded in the lists below.

Dr. Lumholtz lists the following Papago design names:—

Dog tracks, Fig. 65a, b, c.

Saguara, Fig. 67ab,

Turtle, Fig. 62a.

Martynia, Fig. 65ab,

Juice-falling-from-saguara-fruit, Fig. 60a.

Dr. Russell's list of Pima design names is as follows:—

Atcuta — black center of all baskets.

Kakiopins — "crossed lines."
Kamketcit — "turtle," Fig. 62a, b.
Mavspitchita — "locked together."
Moumvitcka — "triangular," "terrace," Fig. 63.
Opumusult — "parallel lines doubling upon themselves," Fig. 60d, e.
Pan ika kita — "coyote tracks," Fig. 65a, b, c.
Sa-si — "figured."
Sihitalduwutcim — "whorled," "spiral," Figs. 65d, c, f, 64 c.
Sisitcutcufik — "very much figured," Fig. 66e, f.
Stoa — "white."
Supeputcim kakaitoa — "striped with black and white."
Tasita — "set" or swastika.
Tcoho-otcilt — "crooked lines" or fret, Fig. 60c.

To these lists must be added a Pima name for a more recent design, not present fifty years ago, the "squash blossom"—Fig. 66a, b, c, and one given by the Papago to the design Dr. Lumholtz reports as "juice falling from saguara fruit," that of "deer tracks in woods," of which Fig. 60a, shows a simple rendering of a design with a number of more elaborate forms produced by folding and doubling the long continuous line. The design "dog tracks" is the same as "coyote tracks," and the design "turtle" is quite similar, but composed of more rectangular spottings, and quite frequently enclosed in a square, or covers an entire basket. One hears so frequently the design names, "coyote tracks," "turtle," "martynia," "crooked lines," "terrace," "squash blossom" that one is forced to believe that these designs have been so designated for many years.

An interesting transition stage is at present in process in the art of these people, both as to shape and design, owing to the influence of civilization: new shapes suited to the life of civilized man, and new designs due to his call for a meaning to the patterns. In response to this influence the Pima have greatly altered the shape of their baskets, so that curio shops are filled with the novel forms, waste-paper basket shapes, and large olla jars, beside a variety of smaller baskets, upon which are worked their old motives. These are not exact copies, but parts chosen from the old patterns and repeated in other ways, and often in a careless manner. To these are added, through the encouragement of traders, two other motives, the human form and that of animals. The Papago have introduced into their modern baskets, new material, new shapes, as well as new designs. But instead of arranging bits of their old patterns in a different way as did the Pima, they have for the last ten or more years been inventing fresh motives, based upon objects in their surroundings. Desert plant life has furnished many motives; the giant saguara is represented by a simple shaft (Fig. 69), or

branched on one side (Fig. 67b) or branched on both sides (Fig. 67a); other cacti by a symmetrically balanced figure with the branches turning up, and others with branches turning down; a general plant form with a central stem and two balanced triangular shapes for leaves; yucca spines by a quadrilateral figure with a fringe of vertical points. Animal life is portrayed in designs of men and women (Fig. 68b); horses, dogs (Fig. 68b), deer, deer trail, coyote tracks (Fig. 67f), rat roads and horned toad (Fig. 67d); the heavens by three stars (Fig. 69); the fields by a design showing ground fenced in; and various other representations show roads, benches, stairs, steps, lightning (Fig. 67e), monuments, kiaha frame, smoke, fire, and arrow points (Fig. 67c). One Pima tray was collected from an old woman who was inventing her designs. Fig. 68a shows this tray with the design "night and stars." This example is a contrast in technic and careful planning of design to the cruder Papago design, whose new type of pattern has not as yet reached a developed stage.

Further consideration of pattern in connection with the units of design, their treatment and arrangement, together with a description of the figures illustrating Papago and Pima coiled basketry will be found in another section of this paper (p. 255).

Lace Coiling.

Decidedly unlike foundation coil with its two elements is lace coil, an openwork texture constructed of one element which corresponds in a way to the binder of the last technic. Crude coil had only one element but it served the two functions, a groundwork and a uniter. Here the foundation is entirely lacking and only the binder is present, but it unites by such a method as to form a surface without a groundwork. In some regions the technic is of stiff materials, when Mason styles it "cyclodial," in others, it is of soft fiber, strips of palm leaf, thong, or sinew, when it is named by the same author "buttonhole coil," and "coil without foundation." Technically, these three are identical, since their only difference is one of name; and the last term is the best since it more tersely describes the method of putting together. Another shorter and equally appropriate name is the one used here, lace coil, since its technic is that of point lace. Hence, lace coiling is a basketry technic of much significance, not only in its usefulness as a maker of openwork bags, carrying frames, garments, and headgear, both utilitarian and ceremonial, but also in its relation to the technic of lace making, for basketry lace coil is the crude beginning of modern point lace. It is of moment that this open texture of native string, from peoples of lower culture, has been carried into civilized life in needle-point lace,

done in thread by the peasants of Europe. At this point basketry and lacework meet, for the one element in basketry lace coil and that of the simplest point lace, are manipulated with the same spiral movement (Figs. 70–71).

The one flexible element in lace coil, like the binder of foundation coil,

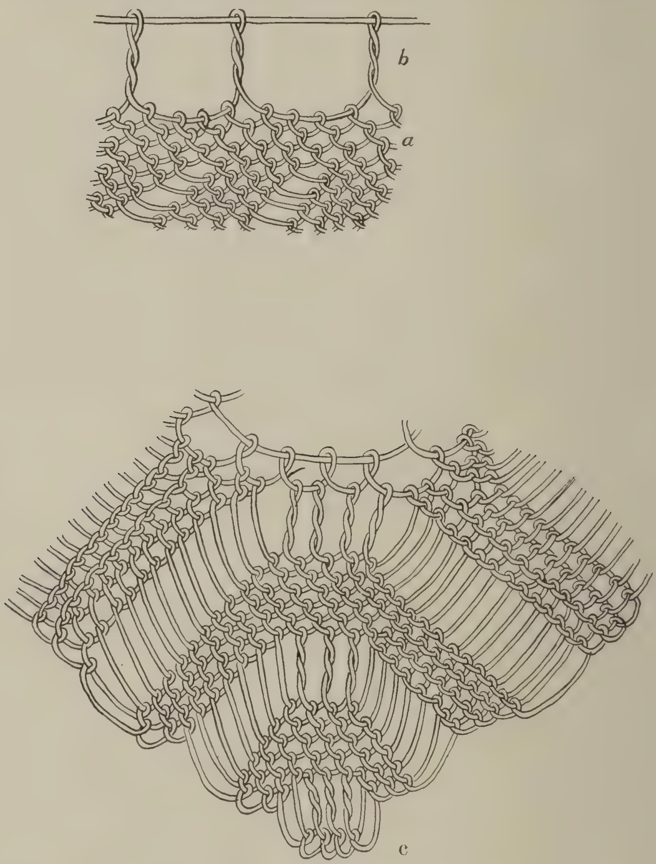

Fig. 70 (50.1–5150, 5237). *a*, Plain Lace Coil; *b*, Twisted Lace Coil; *c*, Elaborate Lace Coil.

advances about the bag, basket, garment, or cap in a large continuous spiral; and likewise while following this larger movement, it unites the adjacent rounds of the technic by looping itself in a small secondary spiral into the previous round of the technic. In this looping, the smaller spiral may move in a plain coil, or it may twist, interlace, or knot while so doing, giving rise to different types of lace coiling. The Pima and Papago practise but two

of these: plain lace coil (Fig. 70a), and twisted lace coil (Fig. 70b, center). This last varies slightly from the simple looping described above, by a wrapping about the upright portion of each loop, before passing to the next.

Although the one element in lace coil is fundamentally so like the binding element of foundation coil, the two technics as found in this region, differ both in the direction of the movement and in the method of building. The direction of the movement in lace coil is towards the right, or clockwise, in what seems to be the most natural direction with right-handed people, for the manipulation of one element with the right hand would more easily

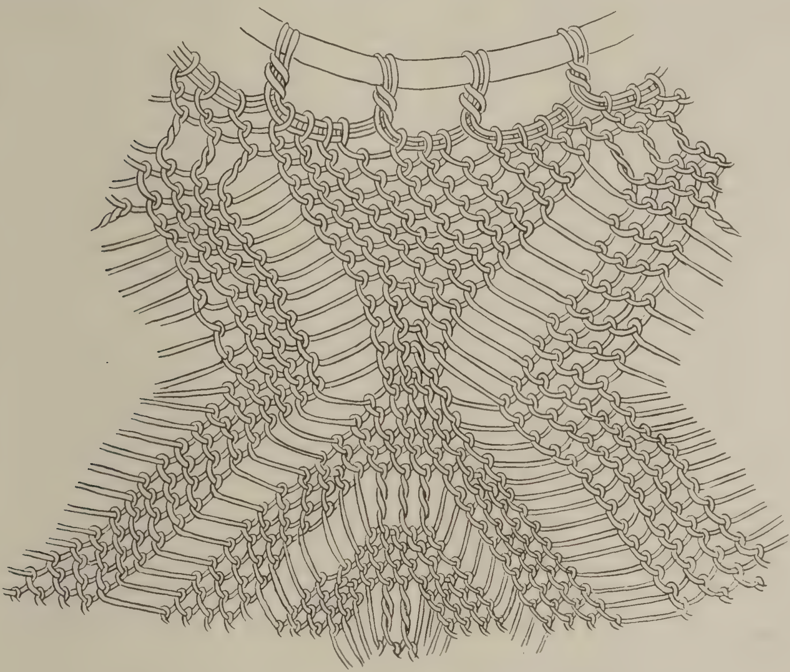

Fig. 71. Lace Coiling showing Elaborate Design.

progress toward the right; but in foundation coil the movement is towards the left, or counter-clockwise. Foundation coil is built up from below, each segment of the spiral rising above the last; lace coil is usually suspended during the making and worked downward, each segment of the spiral descending as the work progresses (Figs. 70–71). Another difference in technic is the interlocking of adjoining spirals in lace coil and its absence in the binder of the foundation coil.

The distribution of lace coiling is a wide one as it is met with in the tropi-

cal and semi-tropical regions of North and South America, Africa, and many of the Pacific Islands where soft fiber plants, and raphia palms grow. However, it is not limited to the habitat of these plants, but has a scattered distribution far to the north and south, not only where fibers of various kinds are found, but where animals furnish thong and sinew for its construction. In the hot lands of Africa, the technic most commonly fashions caps, fetishes, masks, armour suits, and bags; in the warm countries of America and the Pacific Islands, soft bags and carrying frames; in colder countries, game rings, travois, saddle bags, game bags, ceremonial headdresses, and even blankets. Still, in the wide distribution of this technic, nowhere is it found in the beautiful designs which appear on the lace carrying frames and bags of the Indians of southern Arizona and northern Mexico.

In olden days the women of this region were the bearers of burdens, either in the kiaha on the back; or in the basket, the bundle, or the olla upon the head. To assist in carrying their loads on the back, they constructed the conical shaped kiaha, or carrying frame, of lace coiling (Figs. 75–81). One early writer describes it as a "singular piece of framework made of poles with netting for carrying on the back and seen in every wigwam to answer the purpose of wheelbarrow."[1] Since the advent of the horse among the Papago and Pima, the kiaha is not in such constant use as formerly. It was almost indispensable as a carrier for all manner of things and there was hardly a home without one. In its light but strong frame were carried fuel, food, and the materials for various manufactures. One day it might be piled with firewood, the desert mesquite; another, with beans, squashes, and grains; and still a third with grasses for baskets, reed for mattings, and fiber for kiahas; while on top of any of these loads might be seen an infant strapped in its basket cradle. Today, the kiaha is not an uncommon object in the out-of-the-way villages, where one can catch frequent glimpses of burden bearers bringing home their kiahas loaded with firewood, grain, beans, and other produce; or can observe the empty carrier leaning against the house wall, or propped by a post of the shed-arbor, or even tossed upon the roof itself.

Papago material for lace coiling is furnished by the great leaves of the agave (*Agave sp.*), and that formerly used by the Pima was the maguey, a species of agave. These fleshy, spiny-leafed plants grow in the higher hills, and are in perfect condition for yielding fiber in the rainy season, so it is obtained then. The best leaves are the soft inner ones next to the central stem, which are gotten with much difficulty, for they must be knocked off with a heavy stick. The leaves are done into a bundle and carried home

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[1] Bartlett, "Personal Narrative," II, 236.

on the head, or are packed into the kiaha and carried on the back. The Papago and Pima construct only one article of lace coiling, their kiaha, or carrying frame. As it was in constant use before the advent of the horse, much fiber was needed for its manufacture. The fiber gatherers then went to the hills in parties, instead of singly as now, since the demand for fiber has dwindled with the passing of the kiaha, and individual women can secure the scant supply now needed.

Formerly, the fiber was prepared on the hills before returning, since fiber was lighter to carry home than the heavy leaves. For the preparation of the fiber, fires were built in pits, the hot coals drawn out, and the thick leaves laid in their place, to roast over night. The skin and pulp from the softened leaves were then scraped off with deer scapulas, leaving the free fiber, which needed only to be washed and dried. The present-day process of preparation, substitutes for the pit fire on the hill, the open fire within the hut. Over this the leaves are put to boil, or laid in the hot ashes to bake and when quite soft they are scraped to clear the fiber, which is then washed and bleached two or three days in the sun (Fig. 72b).

The spinning of the fiber in early days was also a social event, when a number of women assembled for that purpose. Now neighbors may gather, but seldom is there more than one woman of the group who is spinning. This she accomplishes not with the spindle, but on the bare leg, formerly on the bare thigh, but now on the leg just below the knee, for modern clothing makes the first an impossibility. The spinner sits on the ground with her left leg under her, and her right so bent as to be of service during the spinning. On this she places two strands of fiber with her left hand, and with the palm of the right, rolls the two simultaneously away from her, thus giving them a hard twist. These two tightly twisted strands are released by slightly raising the hand, and then bringing it lightly toward her, thus uniting and twisting the two strands into a two-ply cord, by rolling in an opposite direction (Fig. 72a). Spinning between the palms, or on some part of the leg, is widespread among peoples of lower culture, especially for the twisting of vegetable fibers.

The tools for converting fiber cord into this widely distributed technic, show a great diversity in the many localities. At times only natural tools are employed, as the fingers, at others a cylindrical mesh stick or a needle, the first being especially serviceable when an open texture is in process of construction, and the last when a close one. Needles range from those furnished by the animal kingdom, as a pierced fish bone, a hollow flange of the front limbs of the pteropos, or some other bone, as in New Guinea and other Pacific Islands,[1] to those furnished by the vegetable kingdom, as

[1] G. A. J. Vander Sande, "Nova Guinea," III, 184.

the Mexican bamboo needle with pierced eye, or the long splinter palm midrib needle from tropical Africa, with one end sharpened for the point, and the eye end beaten to a fiber, so that it may be attached to the cord it is to carry by being twisted with it.

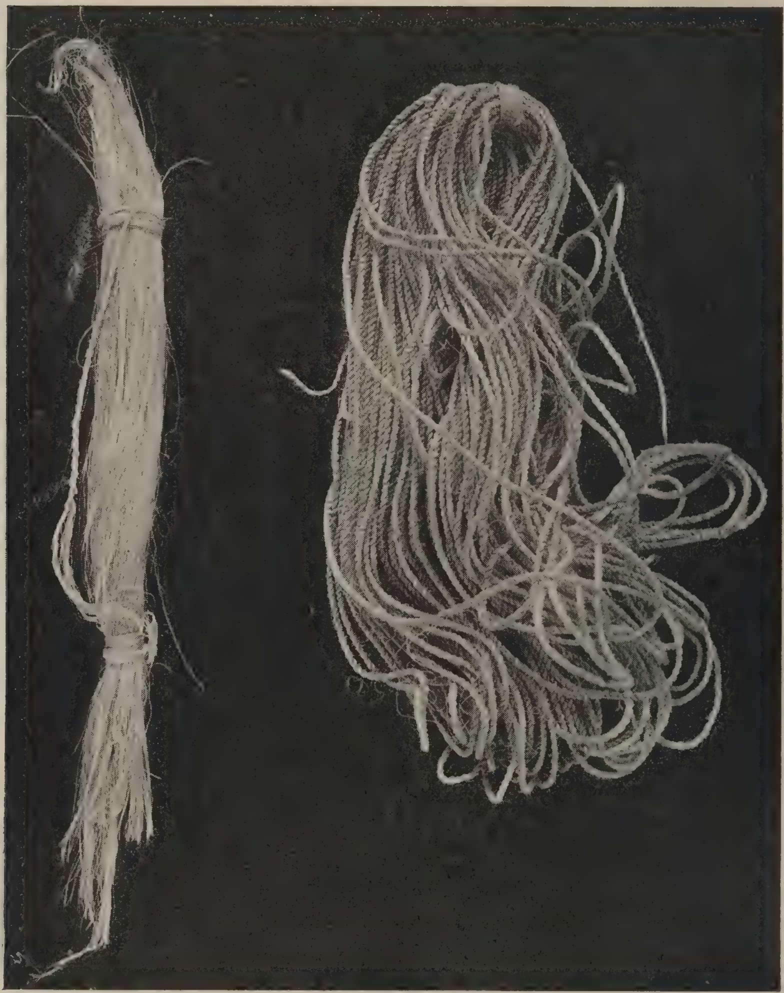


Fig. 72 (50.1–5293, 5148). Agave Cord and Fiber.

The Pima and Papago avail themselves of a number of means for pushing the cord through the loopings. The fingers only may perform the work, or a sharpened stick, or as has been reported a thorn needle formerly served

this purpose, although no information at this late day corroborated this report. Years ago white men brought to them a new material for needle-making, the umbrella with its steel frame. So a bit of old umbrella rib now furnishes material for most of the needles for lace coiling. A bit of the rib with one of the little eyelets attached which earlier fastened the umbrella cover to its frame is first broken off, one end is then rubbed down, and the other has the eyelet carefully preserved for the eye of the needle (Fig. 73a). More recently, the Indians living nearest the cities have procured for lace coiling the store-bought upholsterer's needle (Fig. 73b). The mesh stick, a short cylindrical, or flat rod, finds employment in some localities where openwork lace coiling is made, since over it the loops are thrown while

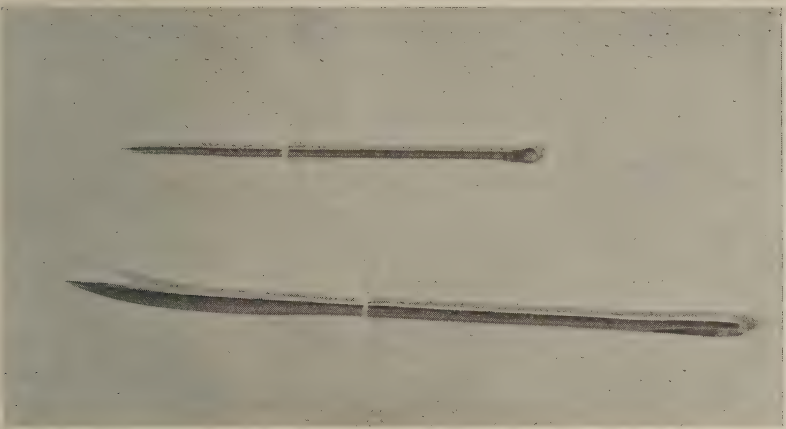


Fig. 73 (50.1–5239, 5240). Needles used for Lace Coiling, Papago. *a*, made from an umbrella rib; *b*, a store-bought needle.

making, to ensure a uniformity of mesh when the lace coil is of openwork texture. None of these were found among the Papago, or Pima, since here the closeness of the mesh does not necessitate, or even permit, its use.

In some regions an artificial support is employed for suspending the work during its fabrication: a post, or a twig, if the shape is circular; a lathe-like stick, or a rod, if it is rectangular. The Pima and Papago use no such support for the beginning rounds of the kiaha although later in the process they throw the beginning string over the big toe, and this acts as a stay for holding the work, thus freeing both hands for the management of the cord loopings. Seated on the ground in tailor fashion the Indian woman first makes a small fiber ring about seven centimeters in diameter and holding this in her left hand she casts upon it the first row of loops (Figs. 70, 74). She loops

a second row into the first row and a third into the second and so continues until a few inches of the work are completed (Fig. 74) when extending one foot she slips over the big toe the beginning ring and in this position continues the looping, or lace coiling, until the kiaha is completed. Interesting as is the simple looped string work, it cannot compare with the elaborate variations of the technic which occur on many of the kiahas after the first few inches of plain looping are passed, for the maker may vary the method of looping by catching the coil into the previous round of the work in two different ways, thus producing two units of design (Fig. 70). Again she may vary the groupings of the design unit, setting some close together, others farther apart, for great latitude in variation is possible in the rhythmic arrangement of the design unit (Figs. 70–71, 74–79).

That this feeling for rhythm is strong in the Indian woman is shown in the patterns. Intuitively, she makes use of this and other principles of design: rhythm, variation, subordination, principles of art which are taught with much labor to students in the schools of civilized man; but this Indian never spent a day of her life in an art school. Originally, in all probability, the variations evolved as the maker played with her string of fiber, but in more recent days a design was copied from that made by the mother. Today, few women make only the one pattern their mothers taught them when girls. This is too monotonous, they like greater variety, and so construct a number of patterns, but always copies of some old design. The faculty for invention together with a native appreciation of design must have strongly influenced kiaha art, while possibly a third factor may have been a force in shaping it, namely, the intense holding of these people to certain ceremonial ideas and religious beliefs, for who can tell what superstitions have been looped into the wonderful point lace kiaha. Probably no one will ever know the meaning of these designs, since if they have significance, it has long been lost to the tribes through the great influx of civilization.

When the point lace cover is completed, the edge is bound by fiber cord to a twig of cat's claw (*Acacia Greggii*) bent into circular shape for the rim (Figs. 75–81). The cone of lace with its wooden rim is next fitted to a spider-like frame of giant cactus rib (*Cereus giganteus*), whose four poles are secured to the lace body by a cord of human hair, or of horsehair, which also ties together the lower ends of the poles at the point of crossing just below the lace cone (Figs. 75–81). A back mat of plaiting (see p. 158), with its soft back pad of shredded bark slipped in where the crossed poles rest on the shoulders, and a headband of plaiting (see p. 164) must also be firmly attached to the kiaha. There remains but one other thing to complete one of the lightest and yet strongest of carry-alls, a carrying frame so well fitted

to the heavy loads these Indian women must carry. This is the intensifying of the lace design with bright-colored paint of indigo blue and red earth, for any design may be painted, and from the applied color become so changed as to result in a number of variations. Paint as well as decorative fringes of skin are also added to the long front frame poles of young girl's kiahas.

During the loading of the kiaha it stands on the ground resting upon the two front frame poles which protrude a foot below the lace body, steadied by a third pole, the kiaha stick, or helping stick as it is sometimes called (Figs. 80–81). It is a long slender rod with a forked end provided for this purpose, that it may act as a prop since its pronged end catches under the kiaha rim and the other rests on the ground. When the kiaha is loaded, the woman gets down on the ground, and shoving her back under the front of the kiaha, slips the carrying band over the crown of her head (Fig. 80a). If the load is a heavy one she will grasp the kiaha rim with one hand as she helps herself to her feet with the kiaha stick in the other hand. Should the load be light, it is not necessary to steady the kiaha, so as she rises, she grasps the kiaha stick in both hands (Fig. 81b). When the load is well balanced upon the head and shoulders, the kiaha stick is either thrust into the front of the load, or used as a staff while walking. When carrying the kiaha the Pima wear the hair parted with it hanging loosely to the front over each shoulder (Fig. 81), but as the Papago dress the hair in two braids a braid replaces the loose hair on either shoulder.

In abundance and variety of pattern, lace coil holds second place to foundation coil, the technic which constructs numberless trays and bowls; kiahas are few in comparison, one for many of the coiled wares, but these few exhibit an elaboration and a delicacy of pattern which is unsurpassed. The designs on the figures here shown are representative of patterns now in use, of which the greatest favorites are Figs. 76ab, 79ab, and 78a. The larger number of kiahas in use before the introduction of the horse and later the wagon, which has lessened the need for this transportation vehicle, may have furnished other designs, since the technic admits of many variations, as is seen on the rectangular bag shapes from farther south in Mexico and South America. These present other varieties in design but not more elaborate ones, since the lace coil patterns on the kiahas of this region are far in advance of those from other areas.

The design must be carefully planned from the very beginning, as made clear in Figs. 74 and 70–71, for it is built of the two varieties of lace coil, and in such a manner that plain lace coil forms a close texture and the twisted variety an open one, and the two interspersed form bands and figures at will. Counting enters largely into this complicated pattern making, which begins with some rhythmic arrangement and unfolds and grows as the lace coiling

continues, widening from time to time with the enlarging form of the cone-shaped cover. It is the entire surface of the lace cover which serves as an unbroken field of design, over which the pattern is spread in two types, the encircling and the radiating, the last of which is the most common and probably in earlier times, the customary one.

Usually, the radiating pattern is divided into four parts, as if planning for the four poles of the frame, and on some kiahas the designs are nicely fitted to the poles but on others more poorly. At times the four divisions are strongly indicated, as in Figs. 75, 76, and 78a, and again less noticeably, as in Figs. 79 and 78b. These divisions are generally marked by a shaft extending from apex to rim, Figs. 78a, b; or part way from the rim, Figs. 76, 77a, and 79; or a short distance from the apex, Fig. 75b. Frequently the shaft tapers from a wider base, especially if rising from the apex of the kiaha (Figs. 75b, 78), but if dropped from the rim it frequently grows to spear shape (Figs. 76, 77a, 79), while again, but less seldom, it may hold to uniform width throughout (Fig. 77b). The design between the shafts may be an entirely distinct unit in itself (Figs. 75a, 76, 77, 78), or the design of quarter sections may be merged into one pattern (Figs. 79, 75b). If the first, the enclosed designs may be formed by horizontal bands (Fig. 77b), oblique bands (Fig. 78a), rows of triangles (Fig. 78b), balanced figures (Figs. 75, 76, 77); or the pattern may consist of meandering frets (Fig. 79) (see later description of kiahas, p. 234).

The addition of color to these designs is the finishing touch, as it intensifies certain parts and also allows a degree of diversification, since any design admits of a few variations through the application of color. When the lace coiled covering is completed and stretched on its frame the red or blue mineral paint is applied to the openwork bands only. An interesting experience long to be remembered was the gathering of three or four Indian women around an old uncolored kiaha which a Pima was supplying with a new rim stick. All wanted the kiaha painted and each suggested a different design, and clamorously insisted that her design be applied.

The three small centers of kiahas on Fig. 74 show the beginning of three different designs after the first few rounds of lace coiling have been passed. Fig. 74a is the simplest, but even here a series of short openwork lines furnishes a neat design; Fig. 74b is a more elaborate one which to this point consists of alternate bands of the two lace coils; Fig. 74c presents a design which radiates with already quite a bit of the evolving pattern to be seen.

The simplest kiaha design represented is Fig. 78b, where the lace covering is broken by four vertical shafts extending from the apex to the rim, thus dividing it into four sections. The shafts taper toward the top from a beginning of eleven plain loopings at the base to four loops at the rim.

They are edged on either side by a band of twisted lace coil, a second band of the plain coil, and a third of the twisted coil, and these three continue across the apex to form four large triangular spaces between the shafts. These triangular quarter sections are crossed by three rows of smaller triangles of plain lace coil, outlined by the twisted coil. Color is introduced on the open bands which outline the quarter sections, first red and then blue; and on the horizontal bands which divide the rows of small triangles by red, blue, and then red; and on the oblique of the smaller triangles blue and then red. A child's kiaha of similar pattern, but much simpler, shows two circling bands of triangles without the dividing shafts, with the lower triangles edged with blue and the upper triangles with red.

Slightly more complicated is the pattern of Fig. 78a, where the four shafts as before divide the lace cover. These are edged with six alternating bands of the plain and twisted lace coil which continue across the apex to form the quarter sections, although here not of triangular shape as before, but quadrilateral with a short base line and a longer top. Within this quadrilateral extend oblique bands of alternating plain and twisted coil so painted in a very dark blue and red as to distribute the colors evenly over this chaste but effective design.

A simple design is represented by Fig. 75b, where the short broadly tapering shafts continue but part way up the covering and are outlined by the two varieties of lace coil in such a manner as to move in zigzag pattern about the kiaha. A shorter shaft is dropped from the rim to fill in the space left vacant by the dip of the zigzag, while color is introduced in the usual alternating lines thus accenting the zigzags.

Another pleasing design, illustrated in Fig. 77b, also has shafts that do not continue to the rim, with the same manner of outlining them as well, and in these remind slightly of the last kiaha pattern. The shafts, however, are slender and remain of uniform width their entire length. Between them are grouped parallel horizontal bands of the two lace coils, with a short dip at either end. Color added in alternating red and blue bands completes this well balanced design.

Figs. 75a and 76a are quite similar in design, but differ in the closeness of texture since Fig. 75a is a better made lace coiling. The two halves of the design within the quarter section balance, for the shaft dropped from the rim in spear shape is so outlined as to produce forms quite like the old-fashioned sawhorse, whose open bands are painted alternately blue and red.

Fig. 76b is also a balanced design and planned on somewhat similar lines to the last two, for the dropped arrow-shaped shafts extending from the rim are outlined by alternating bands of the two lace coils, but so as to form a different figure with a medallion center in appearance, which in reality, however, is a fret motif.

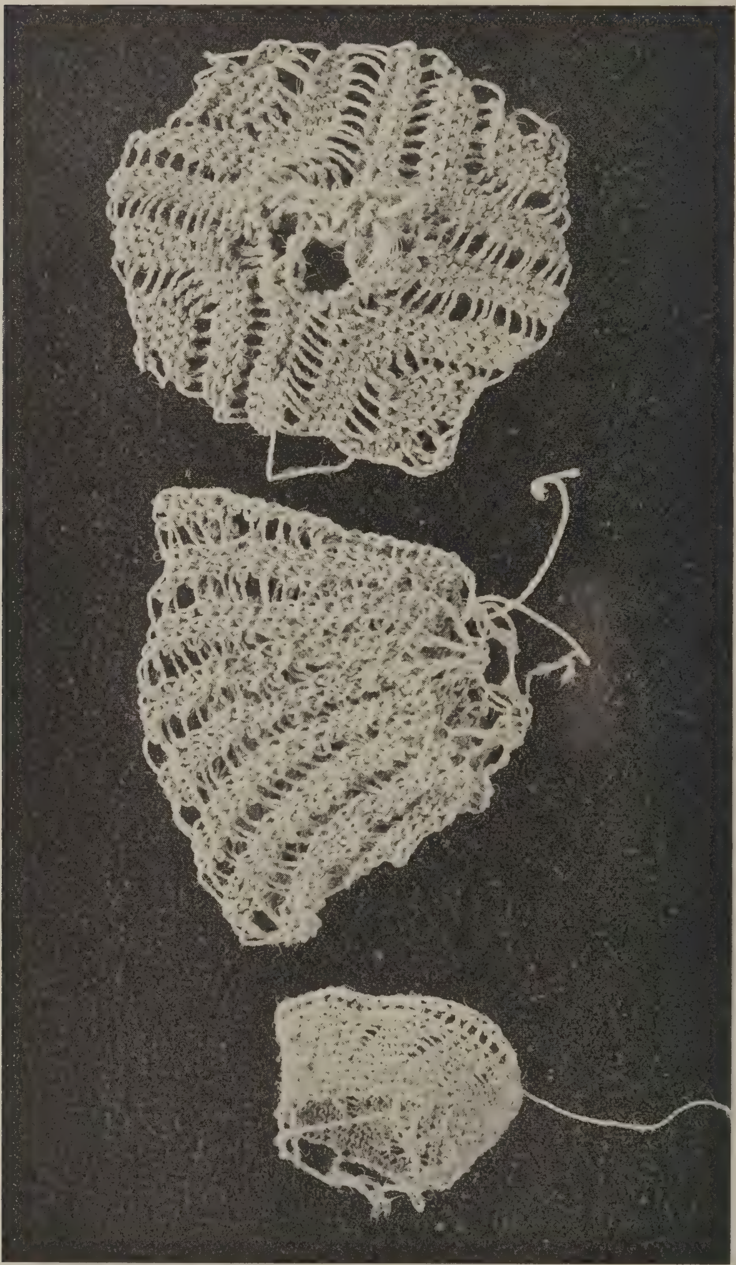


Fig. 74 (50.1–5150, 5151, 5237). Kiaha Beginnings, Papago.

Fig. 75. Kiahas, Papago.

Fig. 76. Kiahas, Papago.

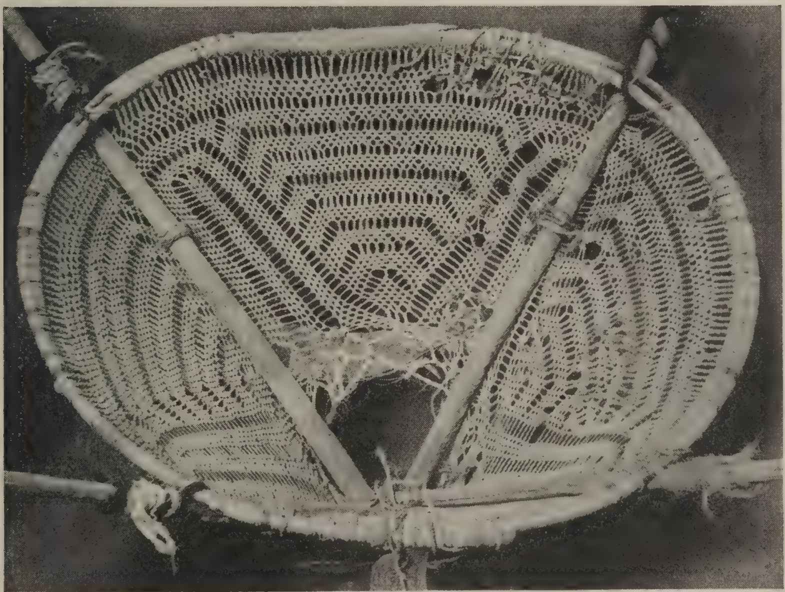
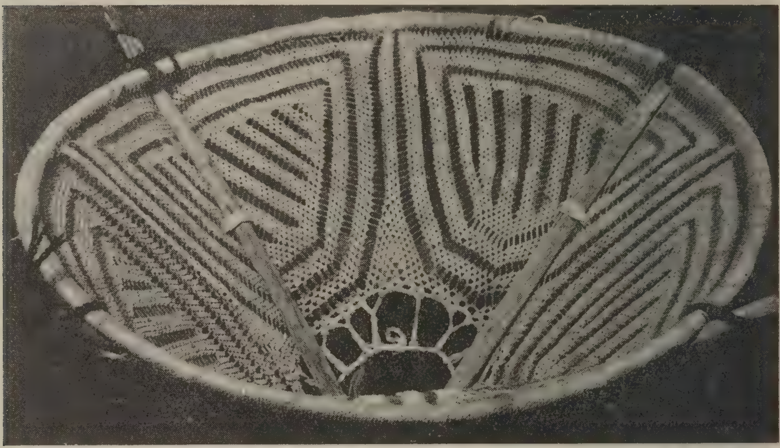


Fig. 77 (50.1–4645, 5326). Kiahas, Papago.



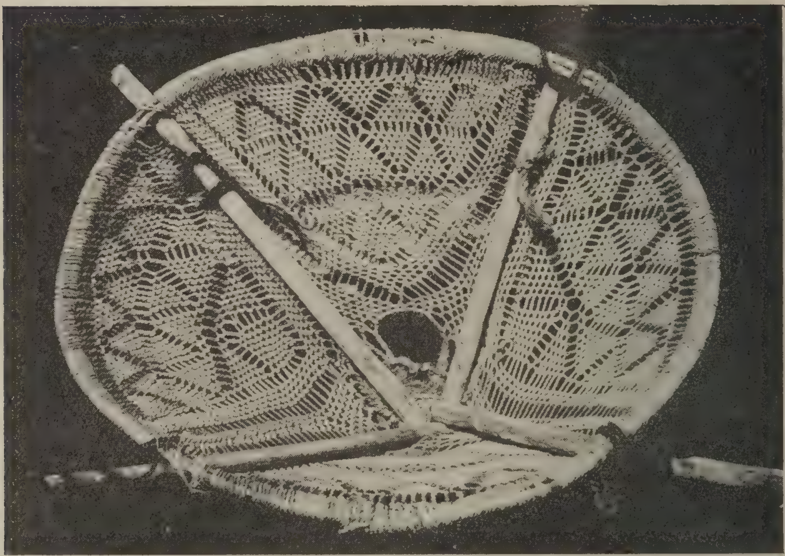
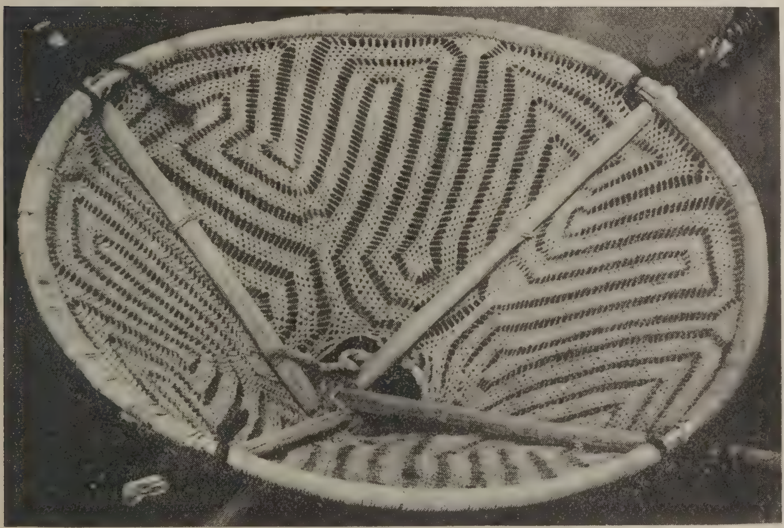


Fig. 78 (50.1–5319, 4529a). Kiahas.

a



b

Fig. 79 (50.1–5333, 5320). Kiahas: *a*, Papago; *b*, Pima.

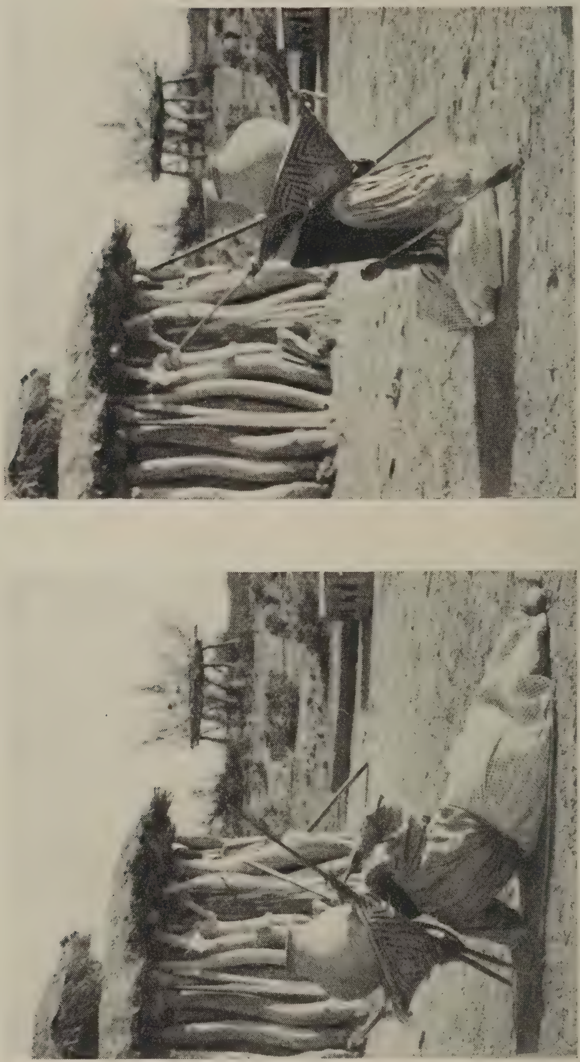


Fig. 80. Kiaha Lifting.

Fig. 81. Kiaha Lifting.

Another seemingly balanced design is that of Fig. 77a with the outlining bands of the shaft so turning and winding as to form a slightly similar design to Fig. 76a, although not so carefully and effectively planned or executed. In reality, it is constructed of eight meandering double lines of the two lace coils, four short ones which pass over a quarter of the circumference, and four long ones which cover half of the circumference. These, with an added short oblique dropped from the rim circle, complete the design.

A closer meander, but not one of broken bands like the last, is the design in Fig. 79a, b, constructed of three continuous double bands, three close bands of plain lace coil with three accompanying openwork bands of twisted coil, which outline the long shaft extending from the rim before doubling upon themselves to form a triangular fret. Color is added to these last two designs in the usual manner.

Evolution of Technics.

Many ethnologists claim that basketry was one of the earliest arts among primitive peoples, since grasses, roots, and twigs could be easily interlaced and twined into simple receptacles. As to the age of the art among the Papago and Pima nothing definite was gleaned, either of the simpler and what appear to be the older types of basketry, or the more complicated. That "basketry was introduced among the Pima one hundred years ago by the Maricopa" is the statement Mason makes in 1902, in reference to the coiled basketry of the Pima.[1] Other reports from old settlers in the Papago villages of the Quijotoa Mountains and the Santa Rosa Valley, the very heart of the present day coiled basketry industry, state that very excellent baskets were made twenty-five years ago, but fewer baskets than now, since at that time they were constructed for Papago use only and not for sale, while now popular demand has resulted in an active trade in them. The Papago coiled ware of twenty-five years ago was more carefully made than that today, since much of it was water-tight, at times serving as basket buckets for drawing water from the well, and as vessels for watering stock. Even up to the last few years basket bowls for watering horses on the journey, were strapped to the saddle and these, together with the older long bottle-shaped basket olla, used in pairs, hung from either side of the horse, made journeying on the desert less dangerous. The custom of burning at death the belongings of the deceased, has deprived the world of many Papago and Pima baskets. Good luck favored at this time the find-

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[1] Mason, O. T., "Aboriginal American Basketry" *Nat. Mus. Rept.*, 1902, 519.

ing of one old basket, for by mere chance a discarded bowl much the worse for wear, was discovered resting on a refuse heap back of an Indian hut in Quijotoa. On the morning when this old fragment was rescued from the rubbish heap, the prize of the expedition was secured, for it had been made by a woman long gone, whose great, great grandchildren, aged three and five, were sitting before the hut together with relatives of three other generations of the basket maker, the oldest member of the group being a very aged woman. From this old basket we know exactly what degree of perfection the art of coiling had reached at the time it was made, and it records the stage of coiled basketry five generations ago, both as to technic and design. The art at that time was advanced, for it had indeed reached a high degree of perfection and elaboration (Fig. 61). The technic is even and water-tight as attested by the stitches near the edge of the rim for securing the leather thong by which it was suspended from the saddle, announcing that this aged bowl did service on journeys for the holding of water. The design is a two band fret of complicated pattern, and as handsome a Papago design as the writer has ever seen.

One point of interest connected with the age of coiled basketry is brought up by the small plaited center or beginning. Coiled ware of most tribes is begun by bunching together a bit of basket material, and turning it to make a small ring, and then binding it, and the coiling worked into this ring. Here the small center is plaited, which raises the question, Is this the result of plaiting being the older technic, and was this small plaited center borrowed from the earlier technic?

Leaving the age of the different Papago-Pima basketry technics, until further information gives more light on the subject, we will pass to a discussion on the possible evolution of two technics in the area, which to all appearances have passed from a simpler to a more complex form. It is unnecessary at this time, to expand upon the wonderful inventive faculty possessed by man of lower culture, as displayed in the development of his handiwork. That has already been vividly pictured in the introductory chapter of "Origins of Invention."[1] Nevertheless, with each new instance of his skill and creative power, one marvels anew, and so here, one wonders not only at the surprising dexterity of these Indian women, but also at their mental activity in thinking out these technics, for which they need, what they seem to possess,— well-developed perceptive faculties and a remarkable "scholarship of the senses." Two technics in the region are found in two successive stages, lattice wrapped weave and foundation coil, that appear to connect up in a varying series either of progression or retrogression,

[1] Mason, O. T., "Origins of Invention."

although no positive proof has been found that they have evolved, or declined here.

The simplest, and in all probability the earliest technic in the region is wrapped weaving, a basketry construction very near to fundamental needs, when wants were primitive and the demand for objects to assist in the protection and storage of foods, etc., was paramount (see p. 140). Only remnants of this old basket technic are now to be found, as the crude wrapping of a pliable binding element over stiff slats, arranged in parallels, has almost entirely disappeared but a few old doors for huts and storage; houses, crude cages for live birds and small animals, hanging shelves for preserving food from marauding beasts, and cradles for the infant, are still to be seen in the out-of-the-way villages, where people have held to this early mode of construction. Wrapped weaving seems the simplest way of uniting stiff slat-like strips by means of a soft pliable binding element, and the impossibility of constructing wicker and twined weaving with these materials (see p. 134) must naturally have led these people to this third type of weaving for heavy structures, since nothing but wrapping could be done to unite the unwieldy material at hand. This is accomplished by one of two methods, a plain wrapping, and a latticed wrapping, giving two varieties of the technic in this region, both of which, however, are becoming extinct (Figs. 1–10).

The crudest form of the simple variety constructs the native hair brush (Fig. 8), an article common to many American tribes and made of numerous materials including roots, stems, and leaves of various plants which are tied, knotted, or woven together in a number of technics with a binding element of fiber, fiber cord, or just a strip of cloth, or leather. The technic here is most elementary, merely wrapping and then fastening a bunch of grass, roots, or fiber, at times roughly, at others, more skilfully. A step in advance is the more perfect wrapping found on larger forms, such as doors and sieves, where the technic has developed and taken such form as to be dignified as basketry wrapped weave, since the rods, or slats, act as separate warp elements, laid in a parallel series, and wrapped singly by the binding element, or weft (Fig. 1).

Moving on from the simple wrapped weaving to a second technic, which apparently is found here in two stages of development, we come to a more elaborate type, lattice wrapped weaving (see p. 141), which exhibits an interesting advance, ostensibly conceived through the uniting of the principles involved in simple wrapped weave and in a crude knotting employed over latticed elements in house construction. The walls of Papago and Pima grass huts are built of a parallel series of rods, or stems, placed vertically and crossed at right angles by horizontal parallels placed both on the outside

and inside at short distances apart. These are tied or knotted together at intervals by a fresh young willow twig while green and with its leaves still on, or by a leaf of the Spanish bayonet beaten slightly to soften it, that it may be more pliable and tie easily (Fig. 9). Lattice wrapped weaving adopts the latticed elements of house construction, and the uniting agent of wrapped weave.

The second technic which appears to have evolved in the region is foundation coiling, represented in two different stages by two distinct coils, an undeveloped variety (Figs. 27, 28), and a fully developed one (Figs. 34, 59–66). Foundation coil in its simplest stage is so rough in appearance that one wonders what this brush-like structure can be, as it seems but a tangle of stems which might possibly have grown so (Fig. 27). But this mass of twigs with so unprepossessing an aspect has a definite method of construction which forms a crude coiled ware, the simplest basket work coiling now known (see p. 172). The technic is most elementary, for it is built of one element which supplies the functions of the two elements in fully developed foundation coil, a foundation and a binder. It is unique how the serving of two distinct functions is accomplished by the one element composed of separate twigs, which, however, does not construct a strong, or a durable structure, but one which must be made new each year. It could not possibly be strong as there is no true foundation, and the single element is also engaged in the uniting process; neither is there a true binding element as it must serve also as a supporting layer; and also it is only loosely secured by the two extremities of the twig, the stem end and the leaf end which twist about the last twig of the round in process, without entering the previous round other than a loose thrust into it. Still, it is astonishing how well the basket granary which it builds hangs together even for a year of service. Its one element, like all coiled ware, moves in a continuous spiral from base to rim, but unlike other coil it has its double function to perform, that of acting as a foundation, and also as a binder in uniting its own adjacent rounds, and as has been shown, it does this uniting in the unique manner just described.

A decided step in advance in foundation coiling, is its second stage of evolution, for fully developed coil is composed of two distinct elements with separate functions: a foundation with a duty of its own in furnishing the groundwork, and a binding element with work of its own to perform in joining together the groundwork. Fully developed coil, like crude coil, is built in a continuous spiral with its adjacent rounds, or segments, united into a solid surface; but in contrast its two elements work separately, although jointly, and so form a firmer, smoother, closer, and more durable structure (Figs. 34–35, 59–66), than did coiling of one element. Foundation

coil of two elements is seen in this region in two degrees of finish: in a coarse open technic on granaries (see p. 179), and in a more refined and closer technic on trays and bowls (see p. 179). Both Papago and Pima construct their technics in the easiest and most natural way, crude coiling of one element clockwise, and coiling of two elements counter-clockwise, when due consideration is given as to the side desired for the outer, or smooth surface, which with the general run of bowls is the outside, and with trays, the inside. A seeming exception to the counter-clockwise movement of foundation coil when building large coarse granaries as seen in Fig. 39, is cleared up by noting that the basket is entirely worked from the inside.

The natural order of growth has been assumed in this description, an orderly progression in the "unfolding of the arts of life" as one would naturally expect, from the simple to the complex, the crude to the more refined. It seems normal to assume this, and there is no reason now known why crude coiling should not have found early expression among the villages in the vicinity of the streams along which arrowbush grows, or that this early form of crude coiling might not later have led to the highly specialized, perfected coil. Neither is there any ground to dispute why crude wrapping, such as we now find on hair brushes and knotting on house structures, should not precede the more highly developed wrapped weave and lattice wrapped weave. Still it is quite possible that the perfected technics were present first, and that instead of successive stages of advance, that there were successive steps not of deterioration, but of simplification of methods to fit certain needs. To instance, crude coil may have appeared late among the Pima, in response to a need for large granaries in which to store the crops when there was not present sufficient pliable material for foundation coil of two elements, and that this led to a further search for material and the discovery that twigs of arrowbush could be used in this way. No matter what its origin may be, the fact that it has survived to this day, side by side with a more perfect coiling is partly due, no doubt, to its great practical value as a speedily constructed technic of great use.

A further change has come to the coiled basketry of these tribes which must be recorded, a gradual modification effected by the arrival of civilization, which destines that in the near future there will be a widespread knowledge of a different style of coiled basketry from that which has been described in this report. It has already wrought many diversifications, for civilization is fast changing Indian customs, and old methods are fast disappearing, so that these innovations which are incidents in the history of culture must receive attention. In response to new conditions and the call for baskets to suit the needs of civilized man, the Pima have furnished many new shapes

large and small, foreign to the Indian, and the market is flooded with waste-paper baskets, sewing-baskets and many others whose design is treated above (p. 224). The Papago have also responded to the call, but not as the Pima, for their limited supply of material would not permit it. Their problem was not alone that of furnishing new shapes, but of finding a new basket material. Yucca has supplied the need, so that curio shops are full of Papago baskets of yucca, mostly small and of numerous shapes.

Differences between Papago and Pima Coiled Basketry.

Distinctive differences between the coiled basketry of the linguistically related Pima and Papago tribes has not to my knowledge been previously noted, or if so, there is no record of such in print. The terms "Pima basketry," and "Papago basketry," seem to be used interchangeably by most anthropologists and collectors, as covering one group of coiled ware with the conventional black fret designs. Even in our museums it is not unusual to find cases bearing the label "Pima and Papago basketry," in which are assembled indiscriminately, coiled ware from both tribes. In many instances these cases contain few if any Papago baskets, since collectors have secured their material from small dealers, who do not know the Papago basket, or if they have obtained them on a "from hut to hut canvas" among Papago villages, they have neglected to inquire as to the maker of each basket, else they would have detected that side by side in these huts is coiled ware from both tribes. That this should have escaped the investigator is not strange, since a hasty inspection would not reveal that desert conditions had been agents of Indian trade, and that an extensive traffic had brought many Pima basket trays and bowls to the Papago, who style them "baskets from the other country." Scarcity of basket material for making their own coiled ware demanded trading either in the raw material, or the finished basket and in many cases the last was found preferable. When this mingling of coiled ware from both tribes was first perceived in Papagueria, and when it was noted that a distinct designation, "baskets from the other country," was given to Pima baskets, a careful study was immediately begun of all coiled ware in use in and about the Papago huts, with special reference to differences which might exist. A diversity proved to be the case, for a marked differentiation was found between the baskets of the two tribes. The discovery of a variance remained for an intensive study of their textile arts, research which showed without a doubt, that the coiled basketry of each tribe has distinguishing characteristics, each a distinct place of its own among that of other basket-making peoples of lower

culture. These facts of difference which were obtained with persevering inquiry are the subject of this chapter, but their discussion will exclude the newer baskets made for sale (see p. 224).

Coiling is the basketry technic by which these people are known, for "Pima and Papago basketry" means to the world their light colored trays and bowls with the black fret designs. That coiling should be thus singled out to receive this distinction is not strange since it is their most elaborate technic. The quality of the materials employed in its manufacture; their painstaking gathering and preparation; the fineness, closeness, and perfection of workmanship in its construction receive only just recognition in giving this technic first place in their basketry. So it is the technic best suited to be chosen by these people upon which to devote their leisure time in perfecting and decorating. It was a technic upon which to impress individuality; hence, the importance of the difference in Papago and Pima coiled basketry as a possible factor in the cultural differentiation of these tribes.

To fully appreciate certain qualities in the Papago and Pima coiled ware a hasty survey of the two habitats (p. 127) will be helpful, since environment is one factor, and a strong one, in occasioning dissimilarity (p. 139). The Papago in their foothill villages are surrounded by a harsh, dry, spiny vegetation which has made use of innumerable means for preserving moisture, enlarging stems and leaves for the storage of water, coating the plant surface, and shrinking leaves to small size, to spines, and to nothingness to prevent evaporation, all to little avail, since plant life has so slight an amount of moisture and flexibility that but one suitable binding material for coiled ware is present, the black martynia. The Pima along the few desert streams which furnish a scattering of willow and cottonwood, use these materials for their coiled ware in preference to martynia which also grows in the region, since splints from the willow and cottonwood twigs are more easily prepared than are splints from martynia pod-hooks. So the Pima make a basket of willow or cottonwood, only using martynia for the design while the Papago very frequently make a basket of martynia with willow design. When the basket is of willow, the design is woven in an exceptionally heavy pattern of martynia. The relation to the environment is here felt since the supply of martynia gives Papago baskets a dominance of dark over light, as the Papago with a minor exception, must procure their binding material from elsewhere; while the supply of willow and cottonwood give Pima baskets a dominance of light over dark for the reason given above (see p. 139). Another difference partially dependent upon environment is that of build, which results from a diversity in foundation materials: the Papago have the harsh beargrass which builds a stiff unyielding structure, but one

of great durability, because of the strength of beargrass; the Pima are provided with the softer cat-tail which builds a more pliable, but less durable basket (see pp. 139 and 195).

Aside from dissimilarity in dark and light, and in qualities of build which seem dependent upon environmental influences, the coiled ware of the tribes shows marked variance in shape, as discerned in the outlines of Papago bowls and trays in Fig. 44 and those of the Pima in the same figure. The bowls differ most conspicuously as the Papago take on a more or less globular shape; the forms are broader in proportion, that is, their width exceeds their height to a greater degree than the Pima; the wall is more nearly perpendicular without the great spread of the Pima; the base is broad and flat; the outline curves rounding, all adding to the general substantial appearance (Figs. 44, 59a, d). Pima bowls are more bell-shaped; the forms of greater height and more slender proportion; the walls more oblique, the rim extending far out beyond the supporting base; the base small and rounding; and the outline curves oval and upspringing (Figs. 44, 63a, and 65d). The trays show the same contrast as to form, but in a less degree, since the low tray form restricts variation. Papago trays when compared with Pima are slightly deeper in proportion to width, the slant of the wall, although oblique, is at a narrower angle owing to the broader, flatter base, while the outline is less likely to be in double curves (Fig. 44).

Could we handle these baskets we would find diverse qualities in build not yet accounted for. Papago ware, especially the bowls, is thicker in wall (Figs. 59b and 65c), more firm and hard, owing to a tighter drawing of the binding element (Fig. 59b), and more irregular in the segments of the binder (Figs. 59a and 61), than are the coiled baskets of the Pima whose walls are thinner (Fig. 65a) and more smooth and even (Figs. 63 and 65).

Comparing the coiled ware of the two tribes for aesthetic differences one is first impressed by the strong feeling for large masses of dark and light on Papago baskets (Figs. 59a, b, d, f, 62c, 64a, b), and a feeling for line on the Pima, which is expressed in a network of black. The massing of dark and light on the Papago ware is produced in a number of ways: by the grouping of lines as in Figs. 59b, c, d, e; or by a greater width of the design line as in Figs. 59f, 61, 64a, b; or by dark spottings as in Figs. 59b, d, 62c, and 65c. The thin line tracery on the Pima baskets is effected by the use of narrower and more elaborate design lines than commonly found on Papago baskets, as seen in Figs. 63 and 66d, e, f, and when spottings occur as in Figs. 60c, 63, 64d, and 65d, e, f, they are smaller, adding a dramatic note to the pattern as the bits of dark sparkle amidst the intricate traceries, quite in contrast to the more dignified massing of darks by the Papago. A second impression received from these baskets is that the Papago deals mostly

with horizontal line which give a restful stable quality to the design (Fig. 59). While it is true the Pima uses the horizontal line it is only in a secondary way, for it is held in subservience to a more dominant motif, an active one, the spiral, or the whorl (Figs. 63 and 65). Even many of the rosette patterns, which appear to lack the active note as they are not spirally built, have a strong feeling of motion caused by a breaking by oblique lines (Fig. 66e, f).

On searching for differences as exhibited in pattern we find the Papago have a number of distinct types including the following: the encircling fret (Figs. 61 and 64a, b); the horizontal band in several arrangements (Figs. 59 and 62b, c); and the vertical fret (Fig. 60a, b). The Pima also have a number of types including: the fret which is quite unlike that of the Papago (Figs. 60c and 64d, e); the rectangular whorl (Figs. 62d, e, f and 63a, b, c); the triangular whorl (Figs. 63d, e, f, 64d, 65a, b); the spiral (Figs. 60e, 64c, and 65d, e, f); and the rosette (Figs. 64f, 66). Still because pronounced differences have been found in the patterns of the tribes, it does not mean that it is always an easy matter to differentiate, since the designs of the two have become mingled and exchanged, and one finds Pima designs on Papago baskets and likewise Papago design on Pima baskets. Hence, it is frequently difficult to discriminate; still by taking the older baskets of each tribe and noting the exclusions, one gets a working basis upon which to build and also to weed out.

Following the distinct types of each tribe further, watching also the manner in which the two differences, light and dark, and line activity evolve, let us scrutinize more particularly, first examples of Papago design and then of Pima. In addition to Papago plain black baskets, which are mostly bowls, and are still found in the outlying districts, are black bowls with the simplest form of Papago design, broken bands arranged in parallel horizontals (Fig. 59a). These parallel series of horizontals may be connected with parallel obliques as in Fig. 59d, a design which shows considerable variance both in the length of the horizontals and in the length and width of the obliques, but in almost every case, as here, the black overbalances the light. A third arrangement of parallel horizontals and a vertical grouping, as was the last, is connected by parallel verticals, whose uniting may form the more usual simple rectangular zigzag of Fig. 59b, or the less usual enclosed rectangular shape of Fig. 65c. In the first case the lines of the design are frequently of varying widths as in Fig. 59b, in the second, they are more usually of the same widths; but in almost every instance the design is light on a dark ground. A fourth vertical grouping of parallel horizontals is united into separate clusters by means of small triangles (Fig. 59e, f). This design possibly is not Papago as it differs in many ways from other

designs of the tribe, but I am not prepared to say it is Pima. A fifth variation in this grouping of parallel horizontals or, in reality a variation of the third grouping (Fig. 62b, c), with rectangular spottings introduced at the union of the perpendicular elements, suggesting Pima influence (Fig. 66c), and another grouping of these same lines and rectangles gives the pattern found in Fig. 66b. One of the most interesting Papago designs is the vertical fret (Fig. 60a), seen here in its simplest form. The different variations of this motif suggest a play with the long unbroken serpentine line as it doubles and quadruples upon itself in its more elaborate varieties, although it never crosses itself and keeps a line of uniform width throughout, together with one of equal spacing. Here the design is fivefold, elaborate arrangements are more usually fourfold.

Of Pima pattern the fret is probably the oldest and most common design. This motif used alone, is indifferently represented in the Museum collection, since fewer of this design are now to be found, but the student who wishes further study is referred to the 26th Report of the Bureau of American Ethnology, where material is illustrated which was collected at an earlier date when more typical Pima fret designs were to be had. The fret when unaccompanied by other design units is found in encircling bands, simple and elaborate, and in spiral arrangements. It also finds endless employment in union with other units of design, the rectangular and triangular whorl, the spiral and the cross, in single, double, and triple bands. These bands may be uniform in width (Fig. 60d), or uneven (Fig. 63b), spotted at their turning with rectangular shapes (Fig. 60c), interrupted at points of intersection by crosses (Fig. 64d, e), and decorated with the terrace (Fig. 63a, b, c, e, f). The whorl, one of their most used patterns, consists of four central twirling rectangular arms with generally a repeating whorl of four rectangles at the rim (Fig. 62d). The arms vary in length and width, and the shape seldom holds to a true rectangle, but increases in width toward the rim in addition to the variation caused by the swing of the whorl (Figs. 62e, 63a). In the intervening space between the whorls is a fret of two or three bands whose lines are sometimes uniform in width (62d) but often of wider horizontals and lighter obliques (Fig. 63b). The obliques are quite frequently composed of a line of small triangles, forming what is called the "terrace" design. The points of the triangles of the terrace may turn toward the swing of the whorl, or away from it. The triangular whorl, another much-used Pima pattern, consists of three, four, or five twirling triangular arms extending from the base, with a repeating number of triangular forms extending from the rim (Figs. 63f and 65a, b), but here the forms at the rim may hold to the size of those at the center (Fig. 63f), or be much enlarged (Fig. 65a, b). These rim shapes at times may repre-

sent the seed pod of the martynia (Fig. 65a, b) when the design unit is called "martynia." The proportions and the contour of the center triangular whorls vary even more than the rectangular whorls while the intervening fret takes on a multitude of variations from the very simple (Fig. 63f) to the very elaborate (Figs. 63e and 65a, b). The lines composing the bands of frets may vary in width as in Fig. 63e, or be more uniform as in Fig. 63f, while their obliques may be plain or terraced (Fig. 65a and 63e, f). The spiral design of the Pima may be constructed of a number of simple zigzags composed of two elements, a long horizontal and a short vertical or oblique (Fig. 60f), which here is on a Papago bowl, but generally the spiral is decorated at the steps of the zigzag by some small unit of design (Fig. 60e), frequently one or two small squares (Fig. 65d, e, f). The spiral is also combined with the scroll (Fig. 64c). Another Pima pattern and one which is generally thought to be recent is the rosette which appears in several varieties, two of which are seen here, a more floral form (Fig. 66e, f) and one composed of rectangular zigzags and black rectangular spottings (Fig. 66a, b, c). One of the very oldest patterns of this tribe suggests, to a slight degree, a rosette, but more carefully described, it is a maltese cross and hourglass pattern (Fig. 64f). Another very old basket with similar pattern is in the National Museum. The design is so different from others of the Pima that it is to be hoped further research concerning it will be undertaken.

Summing up differences in the pattern of the tribes we find that Papago design is dignified and reserved, while the Pima is full of action and grace; that in handling the Papago is simple, strong, direct whereas the Pima is elaborate, delicate, intricate; that in appearance the Papago design shows a feeling for large masses of dark and light, but the Pima a feeling for line expressed in a network of pattern with small spottings in black; that in technic the Papago make a crude irregular line, while the Pima line is clear-cut and perfect in craftsmanship. In units of design both tribes have the encircling fret but handled in two entirely distinct manners, the Papago have the broken horizontal band effects and the vertical fret while the Pima have the rectangular and triangular whorls, the spiral, and the rosette. Thus the pattern of the two tribes differs in movement, treatment, aspect, technical skill, and design motifs. These dissimilarities in design, together with those of material, build, proportion, contour, finish, and dark and light, obviously give distinct Papago and Pima coiled basketry.

Tabulated Analysis of Designs.

The following description of figures illustrating coiled basketry, is arranged in the order suggested by the preceding study that it may assist further research in the subject. The designs grouped under Papago baskets are undoubtedly Papago, or in exceptional cases more Papago than Pima. The designs grouped under Pima baskets are likewise either undoubtedly Pima, or more Pima than Papago.

Papago Baskets.

Fig. 59a. A design of wide broken bands arranged horizontally on a black ground. A typical Papago design on a rounding bowl of substantial water-tight structure, said to be one hundred years old, from the Santa Rosa region. Entire black baskets frequently take this shape.

Fig. 59d. A second vertical grouping of parallel horizontals connected by parallel obliques on a black ground, design fourfold. A very old globular-shaped bowl of hard water-tight construction from the Santa Rosa region.

Fig. 59b. A third vertical grouping of parallel horizontals united by parallel verticals, on black ground. The design lines in this old pattern are typically Papago in their unevenness and irregularity moving about the bowl in a fourfold rectangular zigzag. A very old water-tight, board-like structure from Brownell.

Fig. 59c. A similar design to the last but three-fold, newer and less interesting. A water-tight tray almost too perfect in workmanship for Papago, but its design and width of design bands place it here, from Santa Rosa.

Fig. 65c. A similar design to Fig. 59b except in the movement of the horizontals which do not flow, but enclose four rectangular shapes, between which are black areas filled with "coyote tracks." A globular shaped bowl from Santa Rosa.

Fig. 59f. A fourth grouping of parallel horizontals united by verticals composed of lines of small triangles in heavy black lines on a light ground, producing a six-fold rosette-like pattern on this well made, but much used old tray from San Xavier.

Fig. 59e. A design similar to the last but in narrower bands of pattern, arranged in a fourfold wheel-like figure on this old water-tight, hard as a board, deep tray with thong saddle attachment, its locality, Covered Wells.

Fig. 62c. A design of the third grouping of parallel horizontals united by parallel verticals similar to Fig. 59b, but the added rectangular spottings at the union of the parallels show Pima influence, although in shape and in amount of dark this very large handsome old bowl from Ankon is Papago.

Fig. 62b. A different arrangement of the design lines of the last plate, which however in manner of enclosing shapes suggests Fig. 62c, although the rectangular spottings show Pima influence, as does also the workmanship on this large well-made, perfectly shaped bowl from Cohatk. One of the interesting problems for later research is this small central design unit "coyote tracks" and the rectangular spottings at the union of the design lines, which may be Papago, or Pima.

Fig. 62a. An all over pattern of "coyote tracks" design arranged spirally and sixfold, which in manner of distribution in a stepped spiral, and in technical skill, as well as in the small black center suggest Pima, but in spacing, amount of dark and quality of handling suggest Papago, on this newer and little used tray, whose design is frequently called "turtle."

Fig. 60a. Another grouping of short parallel horizontals so united by shorter verticals as to form upright frets, in this case fivefold. A most interesting old pattern with a number of more complicated variations effected by doubling and redoubling upon itself the long unbroken line of this simple design. This very old tray is from San Xavier. When more elaborate the pattern is usually fourfold and receives various names, "Juice falling from the Saguara fruit," "Trail of deer in woods," and "Tattoo marks on woman's face."

Fig. 60b. A modification of the last design in a fourfold pattern of wider frets with rectangular spottings which suggest Pima influence, as does the unusual skill in the workmanship on this newer tray from Quijotoa.

Fig. 64b. A splendid example of Papago treatment of the encircling fret in the simple direct handling of broad irregular design lines repeated nine times in the single band of white pattern on a black ground, as seen in this old dough tray.

Fig. 64a. An equally typical example of the Papago fret in two banded pattern with broad crudely irregular and unaccented design lines, fivefold on the inner band and eightfold on the outer, in black on a light ground.

Fig. 61. A superlative example of an elaborate Papago fret in two bands, whose broad uneven black design lines follow a complicated fret pattern, fivefold on the inner band and ninefold on the outer. A fragment five generations old, illustrating the degree of excellence to which Papago basketry had attained in design and workmanship through this old water-tight structure with its remnants of a thong suspension strap attached to this aged bowl from Quijotoa.

Fig. 60f. A pattern of seven black zigzags arranged spirally, quite possibly Pima in design when compared to *e* of this plate, a small hard, water-tight food tray of the medicineman of Santa Rosa, who eats and drinks from it when performing ceremonies or on trips for the sacred salt.

Fig. 63d. A Pima design with Papago handling in spacing and the crude irregular design lines, which form a fourfold pattern, on a deep globular bowl from Santa Rosa, typically Papago in shape and build.

Fig. 66d. A borrowed design of interlacing ovals on a globular incurving rimmed bowl which in shape, in build, and in the attached suspension thong is Papago, on a basket from Covered Wells.

Pima Baskets.

Fig. 60c. A fret design in two separate bands, accented at the turn by rectangular spottings, the wide inner band sixfold, the narrower outer band elevenfold, on a small well-worn tray from Cassa Blanco.

Fig. 60d. A fret design in one band with three connecting frets joined by a series of short verticals, on a small tray whose workmanship appears more like that of the Papago.

Fig. 64e. A fret, terrace and cross design in one band, with two interlacing frets, whose obliques are terraced, and whose points of intersection are combined with two small rectangular shapes to form a cross.

Fig. 64d. A fret, cross, and triangular whorl design in fourfold pattern with the three band fret interrupted by a double cross.

Fig. 62d. A simple rectangular whorl design in fourfold pattern, between whose four center arms and those of the rim run two intervening outlines forming a simple fret. One of the commonest Pima designs on this old well-worn tray from Cassa Blanco.

Fig. 62e. A more elaborate rectangular whorl design with four short central arms only, outlining which are four bands of simple fret, on a small shallow tray purchased at Santa Rosa.

Fig. 62f. A more elaborate rectangular whorl and "terrace" design, with four prominent center arms, repeated by four at the rim, between which run three bands of simple fret, whose oblique lines are edged on the inner side with small triangles, whose points turn with the swing of the whorl, the design termed "terrace." An old well-worn deep tray from Blackwater.

Fig. 63a. Another rectangular whorl and "terrace" design with the four long arms at the center and those at the rim joined to the two outlining frets, whose oblique lines are composed of small triangles turning in opposite directions back to back, an unusual arrangement. A large perfectly shaped and well constructed bowl.

Fig. 63b. A slender rectangular whorl and "terrace" design, with four plain-edged center arms and four repeating rim arms edged on one side with triangles, while the two slender outlining bands of fret, thicker on the horizontals than on the obliques, are edged on the obliques by the terrace design, the points of whose triangles turn away from the swing of whorl. A fine large old shallow tray, yellow with age, from Sacaton Falls.

Fig. 63c. A heavier rectangular whorl and "terrace" design with the four center and rim arms joined to the two outlining frets whose obliques are small triangles with points turned away from the swing of the whorl. A large low tray, in good state of preservation, from Blackwater.

Fig. 63f. A triangular whorl and terrace design, here the triangular form replaces the rectangular, to whose four arms at center and rim are attached the horizontal bands of an elementary fret, with obliques composed of small triangles turned away from the swing of the whorl.

Fig. 63e. A complicated triangular whorl and terrace design, the ends of whose five center arms connect by means of an elaborate fret with five terraced figures extending from the rim, no doubt taking the place of the rim whorl, for from it extend the broad horizontals and delicate oblique lines of the fret, one of which is terraced. A large new well-made bowl.

Fig. 65a. A triangular whorl, fret, "terrace", and "coyote tracks" design of five simple arms at center and five at rim decorated with "coyote tracks," while two elaborate intervening frets, with oblique lines edged with triangles are so arranged as to form a figure of the martynia pod, giving the design the name "martynia." A valuable old tray, fine in workmanship, and one which has seen much service from Blackwater.

Fig. 65b. A similar design of the "martynia" but on a newer and coarser basket, which in technic suggests Papago work.

Fig. 64f. A maltese cross and hourglass pattern with four hourglass-shaped arms projecting from the center with four similar shapes indirectly suspended from rim, the two intervening zigzags follow the lines of the eight hourglass forms but with four breaks at the rim allowing four open paths half way down the wall. An exceptionally finely built very old bowl from Sacaton Flats.

Fig. 60e. A zigzag pattern in four spirals grouped with a small quadrilateral figure, composed of two vertical lines and a triangle, at each step of the spiral. A small tray from Blackwater.

Fig. 64c. A combined spiral and fret design which is eight-fold, each spiral supporting two frets in heavy horizontals and light obliques, with small triangular spottings.

Fig. 65d. A spiral pattern of double rectangles with connecting horizontals, in five stepped zigzags composed of two spirals each, interrupted by a group of two rectangles touching at diagonal corners. A deep old bowl yellow with age, much used but well preserved.

Fig. 65e. A pattern similar to the last, except in six stepped zigzags of three spirals each, interrupted by a group of two rectangles arranged in the letter Z, and placed more diagonally than the last, giving greater motion to design. A shallow old bowl in excellent condition.

Fig. 65f. A pattern similar to the last except in four stepped zigzags of four spirals each, arranged less diagonally. A newer tray shape. The last three designs are frequently termed "whirlwind."

Fig. 66a. One of a series of designs built on similar lines to the next two, and also upon those on the Papago bowl, Fig. 62c, here the shape of tray changes the vertical lines of bowl design to obliques and the interrupting squares nearest rim to wide oblongs. Large black center with four radiating arms, repeated at rim, and four encircling rectangular zigzags with verticals about three fourths the height of wall pattern, on this well-preserved old tray, yellow with age from Cassa Blanco, whose design is frequently called "squash blossom."

Fig. 66b. A similar design to the last but sixfold, the three encircling rectangular zigzags with verticals three-fourths the height of wall pattern, on this newer tray.

Fig. 66c. A similar design to the last two but sixfold, the five encircling rectangular zigzags, with short verticals one third the height of wall pattern, and interrupting squares which suggest the spiral bowl patterns on Fig. 65. Probably Papago make.

Fig. 66e. A design with six central radiating triangular shapes, re-echoed by twelve at rim, between five uniform outlining bands producing a flower-like appearance. A shallow, little-used bowl procured at Santa Rosa.

Fig. 66f. A design similar to the last, but fourfold, with a similar center and six outlining bands with heavy horizontals and lighter obliques producing a more elaborate rosette-like appearance. A shallow bowl, quite new, from Blackwater.

Reflection of Personal Traits.

The differences between Papago and Pima coiled basketry appear to tally with the traits of each tribe in a very singular manner. Significant as seemed the dependence of the basket technic upon the unusual vegetation of the region which has so curiously brought itself, through adaptation, into harmony with the arid environment; and the ingenuity of the Indian in the economic use of the scant resources at hand (see p. 139); of even greater interest and importance is the seeming reflection of physiological and psychological traits in their coiled ware. Thus suggesting that although

man's dependence upon natural resources is great, he can to a degree free himself from external relations, and so direct his activities as to express himself in his handiwork by adroit adaptation, and thus give it an impress of personality, in this case reflecting the traits of his tribe.

The Papago of the solitary foothills are a quiet, secretive, silent people. No visitor approaching their village hears laughter or loud talking, for the quiet of the solitude which has settled around their desert home has left its imprint upon the silent people. In this forbidding habitat, where conditions are so severe, one is not surprised to find a sedate, brave, persevering people, for the loneliness and severity of life in these scattered villages has called for courage, self-reliance, and fortitude to battle with adverse conditions.

In contrast to the characteristics of the Papago we find the Pima with quite a different personality, due in some degree, at least, to their less austere home surroundings along the few streams, and in environs which do not call forth the same strength and fortitude as demanded by Papagueria. So instead of the quiet, stable, character of the Papago, we find the Pima with a buoyant, joyous, social nature, and one which is most temperamental. The Pima are better known than the Papago, to the trader, the collector, the merchantman, and this has changed them greatly; still certain traits can never be altered or obliterated. In matters of neatness and cleanliness the Pima are far from thrifty as shown in the arrangement of hair and dress which indicate decidedly that they belong to an easy-going tribe. However, an artistic temperament seldom gives much thought to personal appearance, but if the negative side of this temperament is shown in Pima dress, its positive side finds vital expression in the expert craftsmanship and beauty of their handiwork.

Phenomenal as it appears, the steady, reserved, seldom-smiling Papago woman constructs the substantial, broad, flat-based, and at times crude form with thick, firm wall; while the light-hearted, temperamental, talkative Pima, living a social life makes the delicate, slender, lighter form with up-springing out-curving wall, of more artistic build and finish. But before discussing to what degree personal traits are responsible for these qualities, one must take cognizance of the fact that influence of personality is not the only controlling force to be accounted for. There are other agencies at work which have a decided effect upon this ware. Environment is one of the strongest of the forces, governing through supply, and lack of supply, the amount of dark and light on the baskets, as well as the degree of rigidity and pliability of build. Environment influences another quality, which came in response to certain needs demanded by the habitat; giving to one tribe a water-tight technic and excluding it from the other, and quite proba-

bly providing a water-holding shape to the one, and not granting it to the other. Function determines to a large degree items of shape and build, especially in bowls (see p. 191), as the broad flat base and globular form with incurving brim of the Papago bowl (Fig. 59a, d) is steadier and holds liquid better, a function not necessary to the small based, out-spreading walled bowl of the Pima (Figs. 63a and 65d); while the substantial build of the Papago has come no doubt in response to a need not found in the land of the Pima. So Papago baskets have an excess of dark, a greater rigidity, and frequently water-tight technic as well as a form suitable for liquids; while the Pima baskets have an excess of light, greater pliability, and not the technic and form fitted for the holding of liquids, because of the influence of environment.

Hence function and materials are strong competitors to the modifying agency of personality. Nevertheless, although much is due to these (see pp. 139 and 191), there are qualities of shape and build which cannot be attributed to these causes. The heavy, substantial, crude qualities of Papago baskets (Fig. 59) and the grace and beauty of those of the Pima (Figs. 63a and 65d), in all probability owe much to a divergence in the personal caliber of the tribes; to a stronger feeling for the fundamental things of life by the Papago, whose simplicity and strength emphasize qualities of utility in preference to beauty in outline or nicety of technical finish; and to a sensibility for the aesthetic by the Pima, whose artistic nature gives greater heed to subtleties of contour and perfection in craftsmanship. The quality of durability, that is the length of a basket's usefulness — its life — depends much upon material; nevertheless, a different handling of the binding element by the two tribes, a firm, tight drawing of the binder by the thrifty, painstaking Papago, and a slighter drawing of the same by the less strenuous Pima, attests no doubt to the effect of tribe modification. Many of the dominant differences in the coiled ware must be a personal expression of the temper and individuality of each tribe, since it is easily seen that it is the self-reliant, never-disturbed Papago woman, living within herself, who constructs not the delicate, light form, but the substantial broad, globular, and at times crude one, with firm, thick wall, while it is the buoyant, joyous Pima living an out-flowing life, who makes not the stout, solid structure, but the thin, less heavy form with up-springing, out-curving wall, of more artistic build and finish.

But it is in design where native powers dominate, although even here the environment is felt in the proportion of dark and light, a strong factor in design. Still to no influence of material or function can be traced the dominance of the horizontal line on the reposeful, stable, dignified Papago's basketry, or the dominance of the active line on the lively, buoyant, joyous

Pima's basketry; nor can a vestige of their control be seen in the heavy massing of large areas of dark and light, or in the simplicity and directness of Papago design; nor in the network of sparkling line, or the elaborateness of Pima design. For an explanation of these one must look elsewhere than to outside causes. Contrasting natural traits of these tribes are reflected in their coiled basketry.

Key to Basketry Technic.

This key to basketry technic is given that the methods of basketry construction and terminology given in the preceding sections of the paper, may be better understood. The necessity for uniformity in classification and terminology is appreciated, that confusion be avoided and the reader be enabled more easily to follow.

The classification recognizes three kinds of basketry, plaited, woven, and coiled ware, the division being based upon their construction or building process, as the elements plait, weave, and coil. The fundamental process of the three distinct technics is easily discerned upon slight examination.

Plaiting constructs a mat-like surface by means of active elements only, which move over and under each other in regular order. No passive foundation elements are incorporated, neither are new elements added after the completion of the base, as those already furnished continue to plait the body of the basket.

Weaving is known by its upright warps extending from base to upper edge, as the surface is constructed on these passive warps, crossed by an active binding element, or weft. Two types of weaving, checked and twilled wicker, are less easily recognized because of the equal size of the warp and weft, but even here the distinct weft element added at the base may be traced encircling the basket.

Coiling can easily be distinguished by the spiral movement of its elements. This consists either of an active element, or of a passive element bound down by an accompanying active element.

The key approaches Mason's classification nearest at types of weaving, although here there are differences. Mason entirely excludes plaiting as a basketry process, while his types of coiled ware are based upon the components of the internal element, the foundation. The composition of the inner element is the last consideration, and a later division than is shown here.

Basketry Technic.

I. Plaiting of Crossed Active Elements.
  A. Parallel elements in two directions.
    1. Over and under one . . . . Checked Plaiting
    2. Over and under more than one . . . . Twilled Plaiting
  B. Parallel elements in more than two directions . . . . Lattice Plaiting
II. Weaving of Active (weft) across Passive (warp) Elements.
  A. Parallel warps in one direction.
    1. Weft interlaced . . . . Wicker Weave
      a. Warps coarser than weft . . . . Wicker Weave
      b. Warps of same size as weft
        a′. Over and under one . . . . Checked Wicker Weave
        b′. Over and under more than one . . . Twilled Wicker Weave
    2. Weft twined.
      a. Weft of two strands.
        a′ Over one warp . . . . Twine Weave
        b′. Over two warps . . . . Twilled Twine Weave
      b. Weft of three strands.
        a′. Plain weft . . . . Three-ply Twine Weave
        b′. Braided weft . . . . Braid Three-ply Twine Weave
    3. Weft wrapped . . . . Wrapped Weave
  B. Parallel warps in more than one direction.
    1. Weft interlaced . . . . Lattice Wicker Weave
    2. Weft twined.
      a. Warps oblique . . . . Oblique Lattice Twine Weave
      b. Warps vertical and horizontal . . . . Vertical Lattice Twine Weave
    3. Weft wrapped . . . . Lattice Wrapped Weave
III. Coiling of Active Element or of Active along Passive Element.
  A. Active element only.
    1. Binder (weft) spiral . . . . Lace Coil
    2. Binder twisting . . . . Twisted Lace Coil
    3. Binder interlacing . . . . Interlaced Lace Coil
    4. Binder knotting . . . . Knotted Lace Coil
  B. Joint active and passive element.
    1. Binding spirally . . . . Crude Coil
  C. Active and passive elements.
    1. Binder (weft) spiral . . . . Foundation Coil
    2. Binder twisting . . . . Twisted Foundation Coil
    3. Binder interlacing . . . . Interlaced Foundation Coil
    4. Binder looping . . . . Looped Foundation Coil

Papago Terminology.

Agave, aholta
Agave leaf, aholt
Arrowbush, schamtum
Awl, auvich (owl)
Basket, whoha
Beans, mone
Beargrass, mau
Blueing, schatuch
Bottle, vaco
Brush, washi
    schoch
    gorwecot
Cat's claw, opot
Cotton, thawke
Cottonwood, oupa
Cradle, vol cŭt
Eagle feathers, ba och aoth
Feather, äoth
Greasewood, schĭ quoy
Gum on greasewood, o shop a gum
Hanging shelf, kochta
Headrings, hä co
Horsehair, cauveumoch
House, bitke (adobe)
    washăke (grass)
    muchăke (ocatillo)
Knife, vinum
Maguey fiber, schoch
Man, awtum (awl)
Martynia, ähōch
Mat, mine
Mat making, miuetha
Medicine basket, washä
Mesquite, que
Mesquite bark, quiolituc
Metate, māchāte
Needle, hoy abŭt
Ocatilla, mu och
Olla, hähä
Owl feather, chocut aoth
Palmea, omuch
Peppers, cōō colt
Pinole, chue; supi chue
Red dust, witch
Resting stick for kiaha, schalake
Rope twister, thadawin
Saddle bags, hocho
Saguaro, has che
Smaller grinding stone, velecot
Sotol, (*Yucca elata*), tach ou we
Spanish bayonet, hovich
Storage bin, vaschum
String, hy
    vechĭna (made of hay)
Turtle, comkchit
Turtle shell, comkchit ulituc
Willow, chirole
Willow bark, chrotolituc
Wheat, pelca
Wheat straw, pelecan wavok
Wood, cō ŏch
Woman, ofă

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ANTHROPOLOGICAL PAPERS

OF

THE AMERICAN MUSEUM OF NATURAL HISTORY

VOL. XVII, PART IV

BASKETRY OF THE PAPAGO AND PIMA

BY

MARY LOIS KISSELL

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